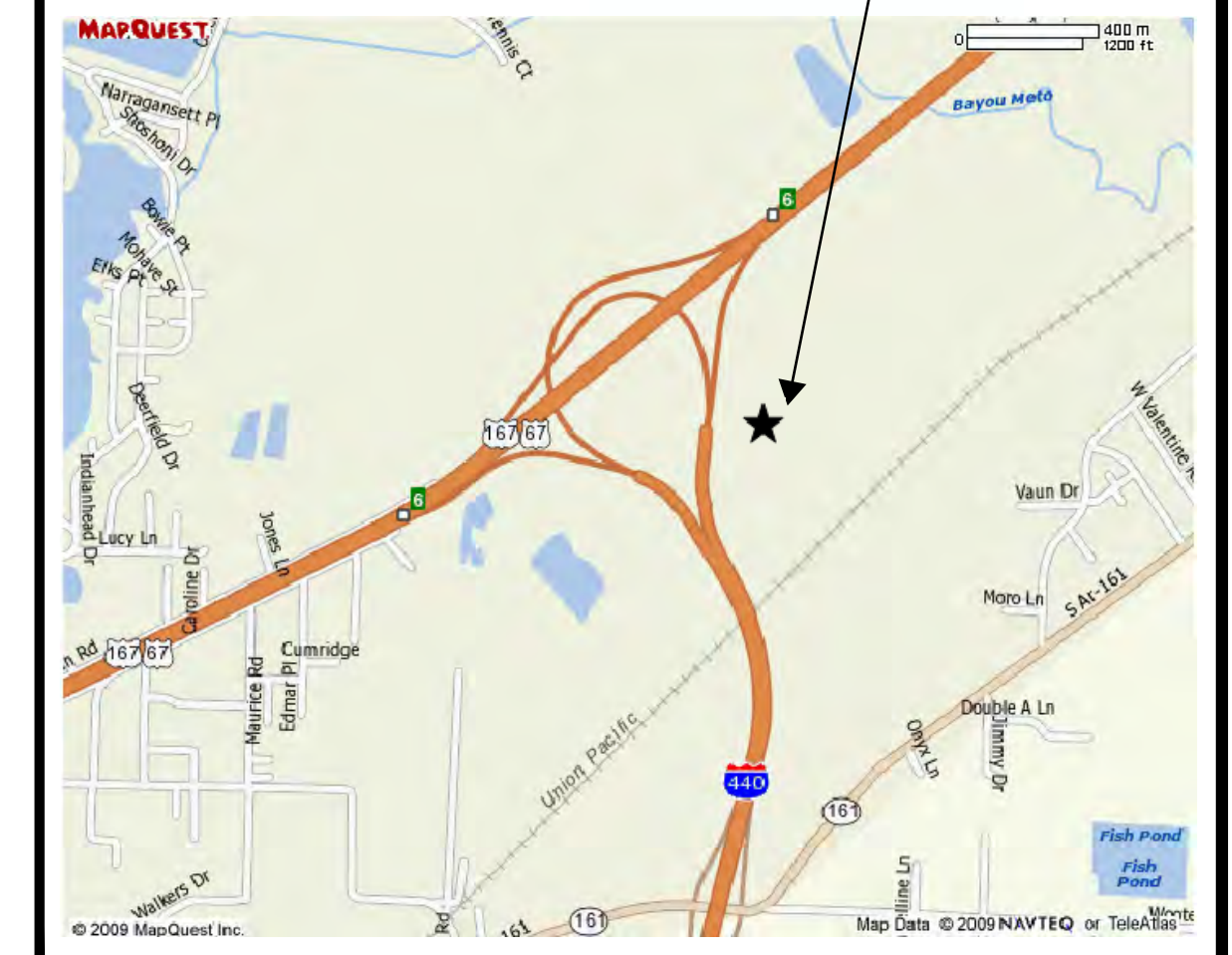


I HEREBY CERTIFY THIS DRAWING AND
INFORMATION SHOWN HEREON WAS TAKEN FROM
FIELD SURVEYS MADE BY ME OR UNDER MY
SUPERVISION AND ALL HORIZONTAL AND
VERTICAL LOCATIONS ARE TRUE AND CORRECT
TO THE BEST OF MY KNOWLEDGE.

Date: _____

POINT SETUP	
	336.50 Top of Protective Cover
X	335.00 Top of Clay Liner
	333.00 Top of Subgrade
	330.00 Bottom of Engineered Buffer
	_____ Liner

TWO PINE LANDFILL CLASS 1 LANDFILL
PERMIT NO. 0163-S1-R3
AFIN:60-00438



MAP PREPARED FOR WASTE MANAGEMENT
W0 PINES LANDFILL CELL 3 CONSTRUCTION
PROJECT NO. - 062-015-35087147
CLASS 1 LANDFILL

JACOBS™

- 10816 EXECUTIVE CENTER DRIVE, SUITE 300 •
- LITTLE ROCK, ARKANSAS 72211 •
- TEL. 501.223.0515 FAX 501.223.2470 •

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CONSULTANTS IN PLANNING,
ENGINEERING, ARCHITECTURE,
CONSTRUCTION MANAGEMENT,
AND RELATED SERVICES

DATE: 9-14-09
SCALE: 1:40
DRAWN BY: H. GRAFTENREED
CHECKED BY: M. JOHNSTON
FILE NAME: CB701542.403

CONSTRUCTION QUALITY ASSURANCE CERTIFICATION REPORT



CELL 3 BOTTOM LINER SYSTEM CONSTRUCTION

**TWO PINE CLASS 1 LANDFILL
PERMIT NO. 0163-S1-R3
AFIN: 60-00438**

PREPARED FOR:

**WASTE MANAGEMENT OF ARKANSAS, INC.
100 TWO PINE DRIVE
NORTH LITTLE ROCK, ARKANSAS 72117
(501) 982-7336**

PREPARED BY:

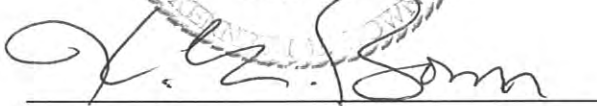
**TERRACON CONSULTANTS, INC.
25809 INTERSTATE 30 SOUTH
BRYANT, ARKANSAS 72022
(501) 847-9292**

SEPTEMBER 2009

The Terracon logo, featuring the word 'Terracon' in a stylized, bold, brown font.

PROFESSIONAL ENGINEER'S CERTIFICATION

"I certify to the best of my professional judgment that the bottom liner system and leachate collection system for Cell 3 of the Waste Management (WM) Class 1 Landfill (Permit No. 0163-S1-R3) was constructed in accordance with the project specifications, plans, and applicable Arkansas Department of Environmental Quality regulations. This certification is contingent on the fact that all information supplied to the signatory authority, at the time of this certification is unquestionably accurate and was provided in good faith."



Ken Bown, P.E.

Arkansas Professional Engineer No. 7139

September 14, 2009
Date

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APPENDIX I	GEOMEMBRANE MANUFACTURER'S QC CERTIFICATES
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1.0 INTRODUCTION

This construction quality assurance (CQA) report summarizes testing and documentation activities performed by Terracon Consultants, Inc (Terracon) during the construction of the bottom composite liner system, leachate collection system, and related work associated with Cell 3 at the Waste Management (WM) Two Pine Class 1 Landfill located near Jacksonville, Arkansas. **FIGURE 1** illustrates the geographic location of the facility.

FIGURE 1. SITE LOCATION MAP



The following document summarizes the earthwork, construction of the subgrade, engineered buffer layer (EBL), compacted clay liner (CCL), bottom composite liner system, geosynthetics, leachate collection system, and the protective cover system. Correspondence, details, quality control test results, and certification associated with the construction are also provided. This document in conjunction with the project as-built drawing is intended to satisfy the requirements of Arkansas Regulation 22, Section 22.428 and Permit No. 0163-S1-R3.

1.1 GENERAL

The construction of Cell 3 was conducted in accordance with the following documents:

- *“Construction Bid and Contract Documents – Cell 3 Construction”*, Terracon Consultants, Inc., January 2009.
- *“Construction Quality Assurance Plan”*, Waste Management Two Pine Class 1 Landfill, Terracon Consultants, Inc., May 2006 (Revised December 2007).
- *“Regulation Number 22, Solid Waste Management Rules”*, Arkansas Department of Pollution Control and Ecology, Solid Waste Management Division.
- *“Permit for the Construction and Operation of a Solid Waste Disposal Facility”*, Permit No. 0163-S1-R3, AFIN: 60-00438, State of Arkansas Department of Environmental Quality Solid Waste Management Division, Effective Date: April 21, 2008.

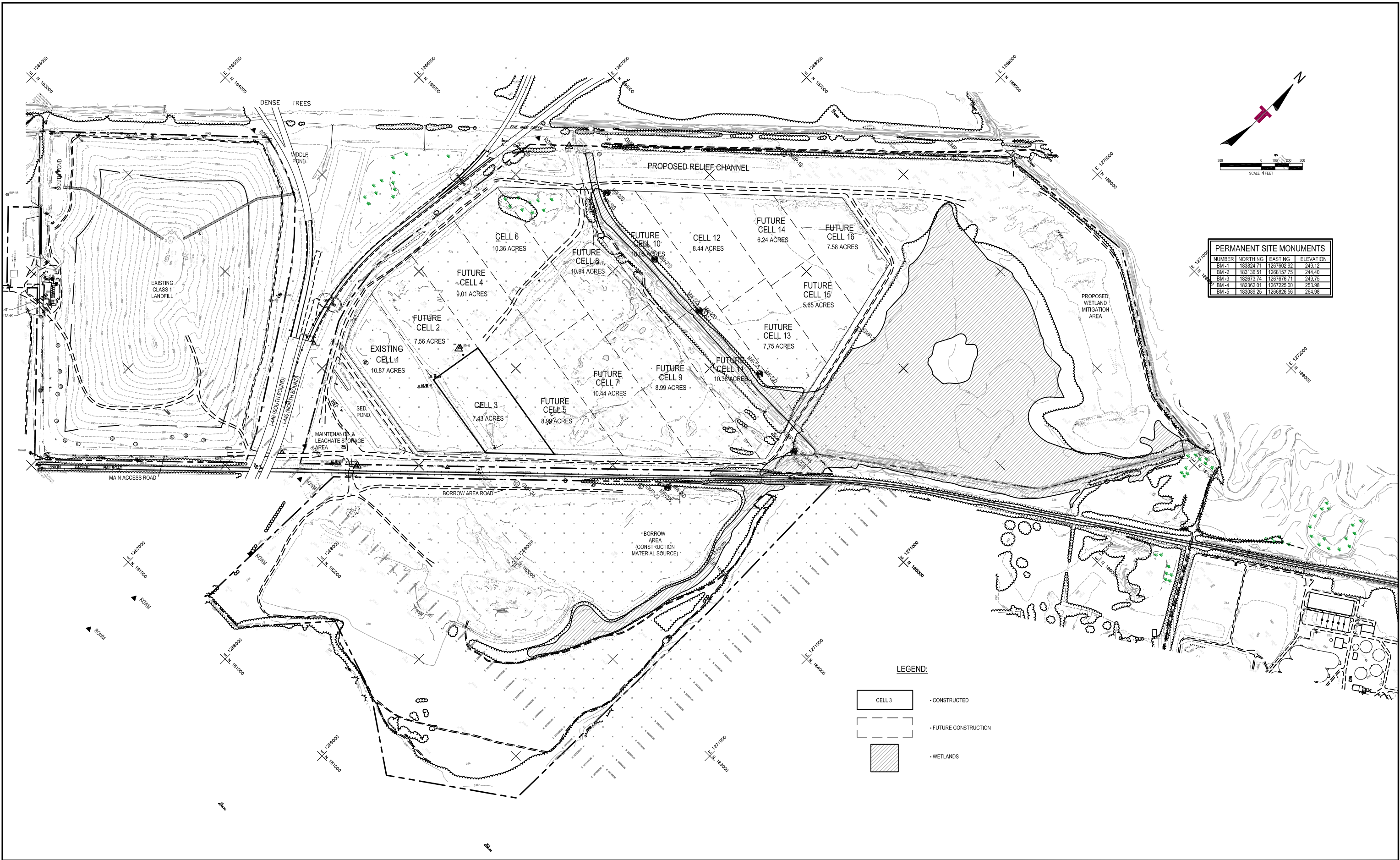
1.2 SITE DESCRIPTION

WM owns and operates a Class 1 Solid Waste Landfill (Landfill) located near Jacksonville in Pulaski County, Arkansas. The Landfill is located at 100 Two Pine Drive, North Little Rock, Arkansas. The Landfill has been in operation since the early 1970's and has been designed, constructed, and is permitted (Permit No. 0163-S1-R3) by the Arkansas Department of Environmental Quality (ADEQ) to accept all types of Class 1 materials as defined in *Arkansas Regulation 22 (Solid Waste Management)*. **FIGURE 2** illustrates the location and orientation of Cell 3 in relation to the rest of the site.

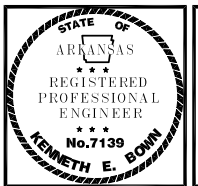
1.3 PROJECT DESCRIPTION

This project involved the construction of approximately 7.4 acres of composite liner system and leachate collection system. The following information summarizes the construction sequence associated with the construction of Cell 3.

- Site preparation, excavation/fill to subgrade, and grading of cell area;
- Preparation of subgrade and installation and CQA testing of 36-inch thick EBL, placed at 95% of the Standard Proctor density with a maximum hydraulic conductivity of 6.0×10^{-7} cm/s;
- Installation and quality assurance testing of a 24-inch thick CCL, placed at 95% of the Standard Proctor density with a maximum hydraulic conductivity of 1.0×10^{-7} cm/s;
- Installation and quality assurance testing of a 60-mil HDPE textured geomembrane liner;
- Installation of a leachate collection system consisting of geocomposite and a center collection pipe embedded in gravel and geotextile; and
- Installation of a protective cover layer.



REV.	DATE	BY	DESCRIPTION





Consulting Engineers and Scientists

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BRYANT, AR, 72022
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SITE LAYOUT MAP

CELL 3 CONSTRUCTION QUALITY ASSURANCE

WASTE MANAGEMENT

TWO PINE CLASS 1 LANDFILL FACILITY

NORTH LITTLE ROCK

ARKANSAS

FIGURE 2

DESIGNED BY: KEB

DRAWN BY: JOW

APPVD. BY: KEB

SCALE: SEE BARSCALE

DATE: 09-11-09

JOB NO. 062-015-35097116

ACAD NO. 006

SHEET NO. 2 OF 5

The CQA Report is organized using tables, figures, and appendices to provide documentation of the observations and material testing during the construction of Cell 3. Daily project field records are presented in **APPENDIX B**.

As required by Reg.22.428(i) the CQA Report includes record drawings of Cell 3 and the appendices and figures identify the following:

Reg.22.428(i)(1) - The limits of liner or final cover barrier construction;

FIGURE 2 and as-built drawings in **APPENDIX A** depicts the limits of the constructed bottom liner system for Cell 3.

Reg.22.428(i)(2) - The top and bottom liner or final cover barrier elevations at 50' intervals referenced to the site grid coordinate system;

APPENDIX A provides the top and bottom elevations of the constructed bottom liner system at 50' intervals referenced to the site grid coordinate system.

Reg.22.428(i)(3)- If a granular drainage blanket is utilized in the design, top of blanket elevation should be identified at 50' elevations;

APPENDIX A provides the top and bottom elevations of the constructed drainage layer system. A double-sided geocomposite was utilized in place of a granular drainage layer. However, an 18-inch thick granular protective cover layer was placed on top of the geocomposite layer and was surveyed at 50-foot intervals.

Reg.22.428(i)(4) The location and elevation of slope breaks, leachate piping, leachate sumps and trenches, berms, and any other features which are material to the disposal area construction;

APPENDIX A provides the location and elevation information and other features of Cell 3 construction.

Reg.22.428(i)(5) A key map showing the location of the construction in relation to the permitted design, along with an identification of areas previously constructed and areas yet to be constructed;

FIGURE 2 and drawings in **APPENDIX A** depict the limits of the constructed bottom liner system for Cell 3 in relation to the permitted design, along with an identification of areas previously constructed and areas yet to be constructed.

Reg.22.428(i)(6) Compaction and permeability testing locations;

Field logs and Drawings in **APPENDIX E**, **APPENDIX F**, and **FIGURES 3** through **5** provide compaction and permeability test locations for the bottom liner system of Cell 3.

Reg.22.428(i)(7) If necessary to document leachate head level compliance (subsections (a)(2) and (g)(6) of this section), the report should also indicate the lowest point of the liner constructed not including leachate trenches and sumps.

APPENDIX A provides the lowest point of the liner constructed not including leachate trenches and sumps.

Reg.22.428(i)(8) In addition, the certifying professional shall make a statement that the cell was constructed in accordance with the permit drawings and narrative. The report should also include a list of any deviations from the permitted drawings, if they exist, and reasons for the deviations.

Cell 3 was constructed as close as possible and in accordance with the permit drawings and narrative and the plans and specifications.

1.4 KEY PERSONNEL

Grayco Construction, Inc. was contracted to perform the earthwork for the project including excavation and/or fill to subgrade, placement of EBL, placement of the CCL in lifts, installation of the leachate collection system, placement of protective cover, and the other improvements at the site. Installation of the HDPE liner and the geocomposite was contracted to Texas Environmental Plastics. The key personnel for each participating firm and suppliers in the project are listed below.

- **Owner:**
Waste Management
 - David Conrad, Market Area Engineering Manager
 - Wayne Mangum, Landfill Manager
- **CQA Consultant:**
Terracon Consultants, Inc.
 - Certifying Engineer: Ken Bown, P.E.
 - Project Manager: Brad Fureigh, E.I.
 - CQA Monitors: Joe Smith, Michael Gombrich and Matt Shepard
- **Soils Contractor:**
Grayco Construction, Inc.
 - Site Superintendents: Robert Fox and Danny Johnson
- **Soil Testing Laboratory:**
Terracon
 - Laboratory Manager: Tim Goodall
- **Survey Control:**
JACOBS
 - Project Manager: Mike Johnston, RLS
- **Geosynthetic Testing Laboratory:**
TRI / Environmental
 - Project Manager: Jennifer Tenney

- **Geosynthetics Contractor:**
Texas Environmental Plastics, Inc.
 - Project Manager: Bob Nantz

- **HDPE Piping, Electric, Concrete, and Leachate Pump System:**
Advanced Fluid Technologies
 - Project Manager: Matt Rankins

- **Leachate Tank:**
Hall Tank

2.0 SUBGRADE PREPARATION

This section summarizes the excavation and establishment of the subgrade surface corresponding to the permitted design for Cell 3. The bottom grading plan conforms to the approved permit plans.

2.1 PROJECT SPECIFICATIONS

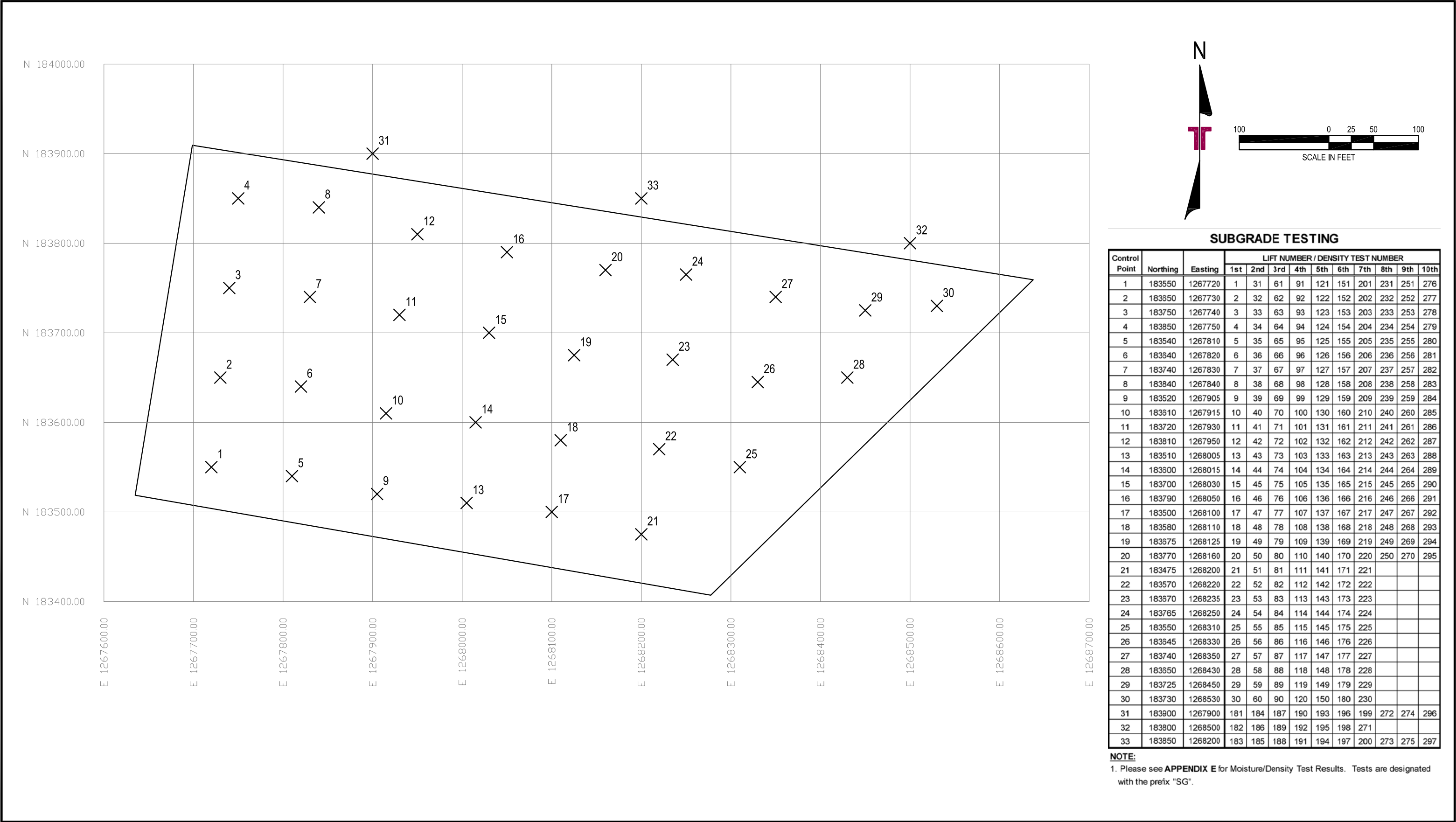
The project specifications called for the subgrade to be established to the lines and grades shown on the project construction plans. Following excavation, the subgrade surface was smooth graded, rolled, and tested to ensure that a suitable foundation was established.

2.2 CONSTRUCTION PROCEDURES

The subgrade preparation and excavation and/or fill for placement of the EBL and CCL associated with the bottom liner system occurred during June and July of 2009. During this period the construction consisted of excavation of the native clays and silts and placement of structural fill to the new sub-grade. The elevations associated with the subgrade surface established are provided in **APPENDIX A**.

2.3 SUBGRADE TESTING

The subgrade was compacted to 95% of the Standard Proctor maximum dry density as verified by a Terracon soils technician. **FIGURE 3** illustrates the locations of the field moisture and density tests for the subgrade. **APPENDIX C** provides preconstruction test results for the subgrade material. **APPENDIX E** includes the field logs for the moisture/density testing performed in association with the Cell 3 subgrade construction.



SUBGRADE TESTING												
Control Point	Northing	Easting	LIFT NUMBER / DENSITY TEST NUMBER									
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1	183550	1267720	1	31	61	91	121	151	201	231	251	276
2	183550	1267730	2	32	62	92	122	152	202	232	252	277
3	183750	1267740	3	33	63	93	123	153	203	233	253	278
4	183850	1267750	4	34	64	94	124	154	204	234	254	279
5	183540	1267810	5	35	65	95	125	155	205	235	255	280
6	183540	1267820	6	36	66	96	126	156	206	236	256	281
7	183740	1267830	7	37	67	97	127	157	207	237	257	282
8	183840	1267840	8	38	68	98	128	158	208	238	258	283
9	183520	1267905	9	39	69	99	129	159	209	239	259	284
10	183810	1267915	10	40	70	100	130	160	210	240	260	285
11	183720	1267930	11	41	71	101	131	161	211	241	261	286
12	183810	1267950	12	42	72	102	132	162	212	242	262	287
13	183510	1268005	13	43	73	103	133	163	213	243	263	288
14	183500	1268015	14	44	74	104	134	164	214	244	264	289
15	183700	1268030	15	45	75	105	135	165	215	245	265	290
16	183790	1268050	16	46	76	106	136	166	216	246	266	291
17	183500	1268100	17	47	77	107	137	167	217	247	267	292
18	183580	1268110	18	48	78	108	138	168	218	248	268	293
19	183375	1268125	19	49	79	109	139	169	219	249	269	294
20	183770	1268160	20	50	80	110	140	170	220	250	270	295
21	183475	1268200	21	51	81	111	141	171	221			
22	183570	1268220	22	52	82	112	142	172	222			
23	183570	1268235	23	53	83	113	143	173	223			
24	183765	1268250	24	54	84	114	144	174	224			
25	183550	1268310	25	55	85	115	145	175	225			
26	183545	1268330	26	56	86	116	146	176	226			
27	183740	1268350	27	57	87	117	147	177	227			
28	183550	1268430	28	58	88	118	148	178	228			
29	183725	1268450	29	59	89	119	149	179	229			
30	183730	1268530	30	60	90	120	150	180	230			
31	183900	1267900	181	184	187	190	193	196	199	272	274	296
32	183900	1268500	182	186	189	192	195	198	271			
33	183850	1268200	183	185	188	191	194	197	200	273	275	297

NOTE:
1. Please see **APPENDIX E** for Moisture/Density Test Results. Tests are designated with the preix "SG".

REV.	DATE	BY	DESCRIPTION



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FIELD TEST LOCATIONS - SUBGRADE LIFTS

CONSTRUCTION QUALITY ASSURANCE - CELL 3

WASTE MANAGEMENT

TWO PINE CLASS 1 LANDFILL

NORTH LITTLE ROCK

ARKANSAS

FIGURE 3

DESIGNED BY:	BNF
DRAWN BY:	JDW
APPVD. BY:	BNF
SCALE:	1" = 100'
DATE:	09-11-09
JOB NO.	062-015-35097116
ACAD NO.	003
SHEET NO.:	3 OF 5

3.0 ENGINEERED BUFFER AND CLAY LINER SYSTEM INSTALLATION

The following section describes the construction of the EBL and CCL. The CCL corresponding to Cell 3 was completed during August of 2009.

3.1 PROJECT SPECIFICATIONS

The project construction plans indicated the EBL was to be constructed in four 9-inch thick compacted lifts to form a 36-inch thick confining layer and the CCL was to be constructed in four, 6-inch thick compacted lifts to form a minimum 24-inch thick re-compacted clay liner. Each clay lift was to be placed and compacted to 95% of the Standard Proctor maximum dry density at moisture content above the optimum moisture content for the clay material. As required in 40 CFR 258 Subpart D and Arkansas Regulation 22, the hydraulic conductivity of the clay was not to exceed 1×10^{-7} cm/s.

3.2 CONSTRUCTION PROCEDURES

Placement of the clay liner material was accomplished using excavators, 30 yd³ haul trucks, tractor with a disc, dozers, a sheeps-foot roller, and a smooth drum roller. The clay liner was moisture conditioned during placement to achieve maximum compaction. Finish grading of the surface was accomplished by utilizing laser-leveling equipment attached to earth moving equipment. Drawings provided in **APPENDIX A** provide the elevations associated with the top of the clay liner for the bottom liner system.

3.3 PRE-CONSTRUCTION TESTING OF ENGINEERED BUFFER & CLAY LINER MATERIAL

Due to the previously tested high quality clay borrow material at the site, approximately eight samples from the construction of Cell 1 in 2008 were used as pre-construction samples for Cell 3. Field and laboratory testing of the engineered buffer and clay liner system material was completed in 2008 as specified in the project specifications, the facility CQA plan, and in accordance with the requirements of Arkansas Regulation No. 22.

APPENDIX D contains the results of the EBL and CCL pre-construction test samples. **TABLE 1** summarizes the results of the pre-construction test samples. The results indicate the materials meet or exceed the minimum project standards.

TABLE 1. ENGINEERED BUFFER AND CLAY LINER MATERIALS PRE-CONSTRUCTION TEST SUMMARY

Test Description	Moisture/Density Relationships ASTM D698	Atterberg Limits ASTM D4318	Particle Size Analysis ASTM D1140, D422	Soils Classification (USCS)	Remolded Permeability (cm/sec) D5084
Project Requirements	Minimum 95% Standard Proctor maximum dry density	P.I. greater than 10	> 50% passing No. 200 sieve > 80% passing No. 4 sieve	SC, CL, or CH	1.0×10^{-7} or less
Sample Number	Test Results				
PC-2	Max Dry Density: 94.2 pcf Optimum Moisture: 25.0%	L.L. 74 P.L. 24 P.I. 50	97.3% passing No. 200 sieve 100% passing No. 4 sieve	CH	1.7×10^{-8}
PC-3	Max Dry Density: 90.5 pcf Optimum Moisture: 27.9%	L.L. 79 P.L. 35 P.I. 44	97.9% passing No. 200 sieve 100% passing No. 4 sieve	CH	2.2×10^{-8}
CS-1	Max Dry Density: 106.9 pcf Optimum Moisture: 16.4%	L.L. 37 P.L. 19 P.I. 18	98.5% passing No. 200 sieve 99.9% passing No. 4 sieve	CL	2.4×10^{-8}
CS-4	Max Dry Density: 107.4 pcf Optimum Moisture: 18.1%	L.L. 33 P.L. 16 P.I. 17	88.7% passing No. 200 sieve 99.7% passing No. 4 sieve	CL	8.4×10^{-8}
CS-5	Max Dry Density: 91.4 pcf Optimum Moisture: 25.7%	L.L. 62 P.L. 24 P.I. 38	95.2% passing No. 200 sieve 100% passing No. 4 sieve	CH	1.1×10^{-8}
CS-6	Max Dry Density: 94.7 pcf Optimum Moisture: 25.2%	L.L. 69 P.L. 24 P.I. 45	99.0% passing No. 200 sieve 100% passing No. 4 sieve	CH	1.0×10^{-8}
CS-7	Max Dry Density: 92.8 pcf Optimum Moisture: 27.9%	L.L. 58 P.L. 29 P.I. 29	96.1% passing No. 200 sieve 98.0% passing No. 4 sieve	CH	1.0×10^{-8}

3.4 CONSTRUCTION TESTING OF COMPACTED CLAY LINER MATERIAL

During the construction of the EBL and CCL, samples were obtained for laboratory testing to verify the consistency of the materials during construction. The results of the construction laboratory testing are included in **APPENDIX D. TABLE 2** summarizes the results obtained from laboratory testing of the EBL and CCL material. Based upon the results of the construction testing performed, the EBL and CCL material samples comply with the project specifications. As shown in **TABLE 2**, one sample (PR-4) tested during the construction phase did not meet the project specifications. Therefore, this material was not used in construction of the clay liner system for Cell 3.

TABLE 2. CLAY LINER MATERIAL CONSTRUCTION TEST SUMMARY

Test Description	Moisture/Density Relationships ASTM D698	Atterberg Limits ASTM D4318	Particle Size Analysis ASTM D1140, D422	Soils Classification (USCS)	Permeability (cm/sec) D5084
Project Requirements	Minimum 95% Standard Proctor maximum dry density	P.I. greater than 10	> 50% passing No. 200 sieve > 80% passing No. 4 sieve	SC, CL, or CH	1.0×10^{-7} or less
Sample Number	Test Results				
PR-1	Max Dry Density: 108.4 pcf Optimum Moisture: 17.1%	L.L. 32 P.L. 15 P.I. 17	86.1% passing No. 200 Sieve 99.8% passing No. 4 sieve	CL	1.2×10^{-8}
PR-2	Max Dry Density: 92.4 pcf Optimum Moisture: 27.5%	L.L. 80 P.L. 26 P.I. 54	97.6% passing No. 200 Sieve 99.8% passing No. 4 sieve	CH	3.8×10^{-8}
PR-3	Max Dry Density: 93.5 pcf Optimum Moisture: 29.3%	L.L. 70 P.L. 27 P.I. 43	96.7% passing No. 200 Sieve 99.6% passing No. 4 sieve	CH	1.0×10^{-8}
PR-4	Max Dry Density: 115.6 pcf Optimum Moisture: 13.7%	L.L. 25 P.L. 17 P.I. 8	81.3% passing No. 200 Sieve 100% passing No. 4 sieve	CL	4.6×10^{-8}
PR-5	Max Dry Density: 111.3 pcf Optimum Moisture: 15.4%	L.L. 30 P.L. 15 P.I. 15	86.2% passing No. 200 Sieve 99.8% passing No. 4 sieve	CL	1.0×10^{-8}
PR-6	Max Dry Density: 94.8 pcf Optimum Moisture: 24.6%	L.L. 63 P.L. 25 P.I. 38	95.6% passing No. 200 Sieve 98.3% passing No. 4 sieve	CH	1.2×10^{-8}

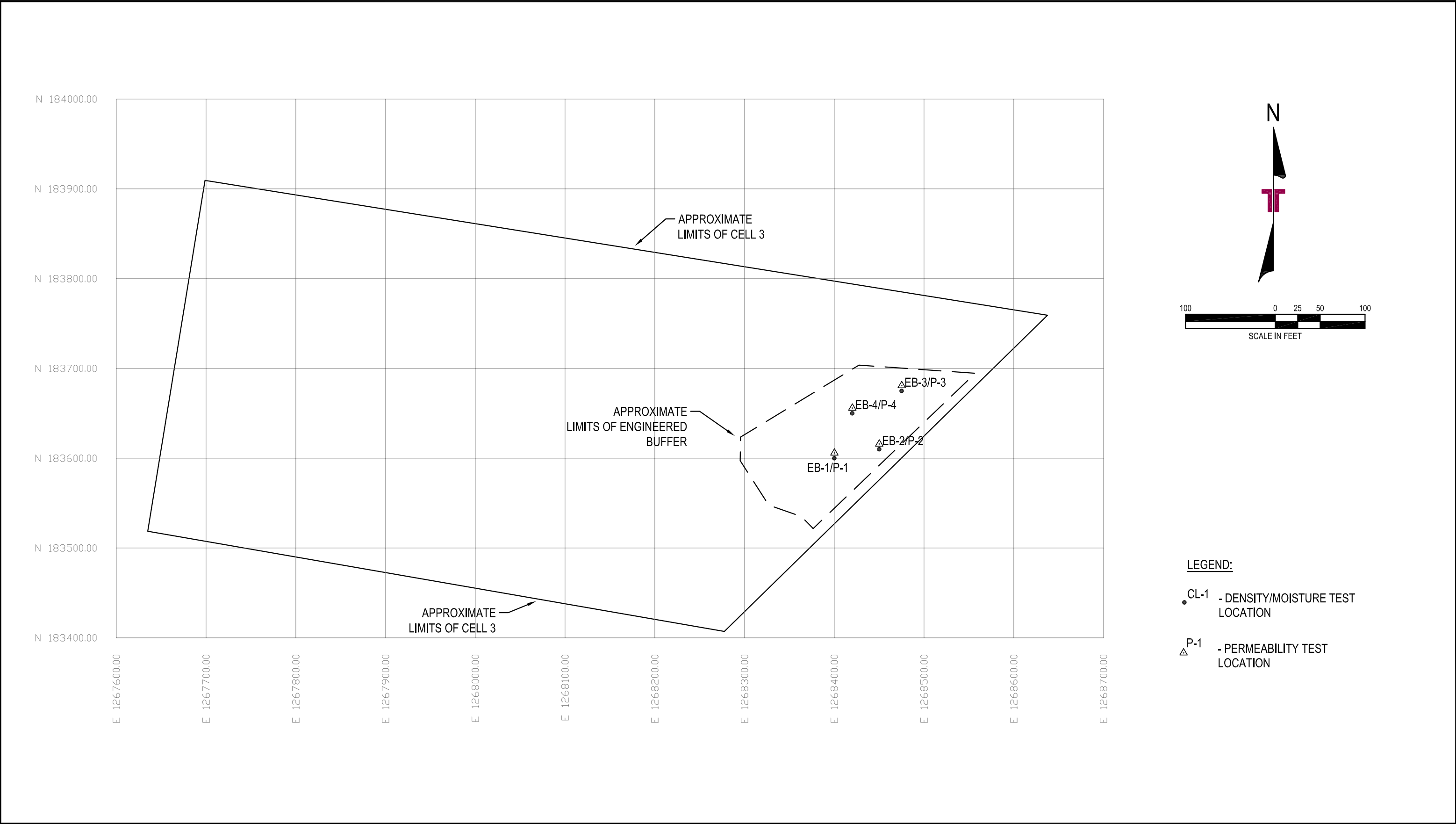
Field moisture and density tests were performed at a minimum rate of one test for every 10,000 square feet per compacted lift. **FIGURE 4** depicts the field test locations performed on each lift of the EBL. **FIGURE 5** illustrate the locations of the field tests for each compacted lift of clay. **APPENDIX E** includes the field logs for the moisture and density testing performed in association with the Cell 3 construction. Based upon the results of the moisture and density tests performed by Terracon, the lifts of EBL and CCL comply with the project specifications.

Shelby tube samples were obtained from each lift at a minimum rate of one test for every 40,000 square feet. **FIGURE 4** and **FIGURE 5** illustrate the locations where the Shelby Tube samples were taken for each compacted lift of EBL and CCL. The tubes were sealed and delivered to the laboratory for permeability testing using a flexible-wall permeameter (ASTM D-5084). As indicated in **TABLE 3**, permeability results for the completed EBL and CCL meet the project requirements of less than 6.0×10^{-7} cm/s and 1.0×10^{-7} cm/s respectively. **APPENDIX F** contains the compacted clay liner permeability test results.

TABLE 3. PERMEABILITY RESULTS SUMMARY

Test No.	Lift No./Layer	Test Results		Test No.	Lift No./Layer	Test Results	
		Permeability (cm/sec)	Pass/Fail			Permeability (cm/sec)	Pass/Fail
Perm 1	1/EBL	9.7×10^{-9}	Pass	Perm 23	3/CCL	1.0×10^{-8}	Pass
Perm 2	2/EBL	1.0×10^{-8}	Pass	Perm 24	3/CCL	9.7×10^{-9}	Pass
Perm 3	3/EBL	1.0×10^{-8}	Pass	Perm 25	3/CCL	5.4×10^{-8}	Pass
Perm 4	4/EBL	9.7×10^{-9}	Pass	Perm 26	3/CCL	1.9×10^{-8}	Pass
Perm 5	1/CCL	4.6×10^{-8}	Pass	Perm 27	3/CCL	2.0×10^{-8}	Pass
Perm 6	1/CCL	1.0×10^{-8}	Pass	Perm 28	3/CCL	1.0×10^{-8}	Pass
Perm 7	1/CCL	1.0×10^{-8}	Pass	Perm 29	3/CCL	2.0×10^{-8}	Pass
Perm 8	1/CCL	1.0×10^{-8}	Pass	Perm 30	3/CCL	9.9×10^{-9}	Pass
Perm 9	1/CCL	1.8×10^{-8}	Pass	Perm 31	3/CCL	2.1×10^{-8}	Pass
Perm 10	1/CCL	9.8×10^{-9}	Pass	Perm 32	4/CCL	9.2×10^{-9}	Pass
Perm 11	1/CCL	9.9×10^{-9}	Pass	Perm 33	4/CCL	3.7×10^{-8}	Pass
Perm 12	1/CCL	1.0×10^{-8}	Pass	Perm 34	4/CCL	1.0×10^{-8}	Pass
Perm 13	1/CCL	2.0×10^{-8}	Pass	Perm 35	4/CCL	1.8×10^{-8}	Pass
Perm 14	2/CCL	1.0×10^{-8}	Pass	Perm 36	4/CCL	1.0×10^{-8}	Pass
Perm 15	2/CCL	9.4×10^{-9}	Pass	Perm 37	4/CCL	2.0×10^{-8}	Pass
Perm 16	2/CCL	5.5×10^{-8}	Pass	Perm 38	4/CCL	5.1×10^{-8}	Pass
Perm 17	2/CCL	1.0×10^{-8}	Pass	Perm 39	4/CCL	1.8×10^{-8}	Pass
Perm 18	2/CCL	1.8×10^{-8}	Pass	Perm 40	4/CCL	1.9×10^{-8}	Pass
Perm 19	2/CCL	9.9×10^{-9}	Pass	Perm 41	1/CCL	9.8×10^{-9}	Pass
Perm 20	2/CCL	1.0×10^{-8}	Pass	Perm 42	2/CCL	1.0×10^{-8}	Pass
Perm 21	2/CCL	3.6×10^{-8}	Pass	Perm 43	2/CCL	2.0×10^{-8}	Pass
Perm 22	2/CCL	2.4×10^{-8}	Pass	Perm 44	4/CCL	9.9×10^{-9}	Pass

Note: EBL = Engineered Buffer Layer
CCL = Compacted Clay Liner



REV.	DATE	BY	DESCRIPTION



Consulting Engineers and Scientists

25809 I-30 SOUTH
PH. (501) 847-9292

BRYANT, AR 72022
FAX. (501) 847-9210



FIELD TEST LOCATIONS - ENGINEERED BUFFER LIFTS

CONSTRUCTION QUALITY ASSURANCE - CELL 3

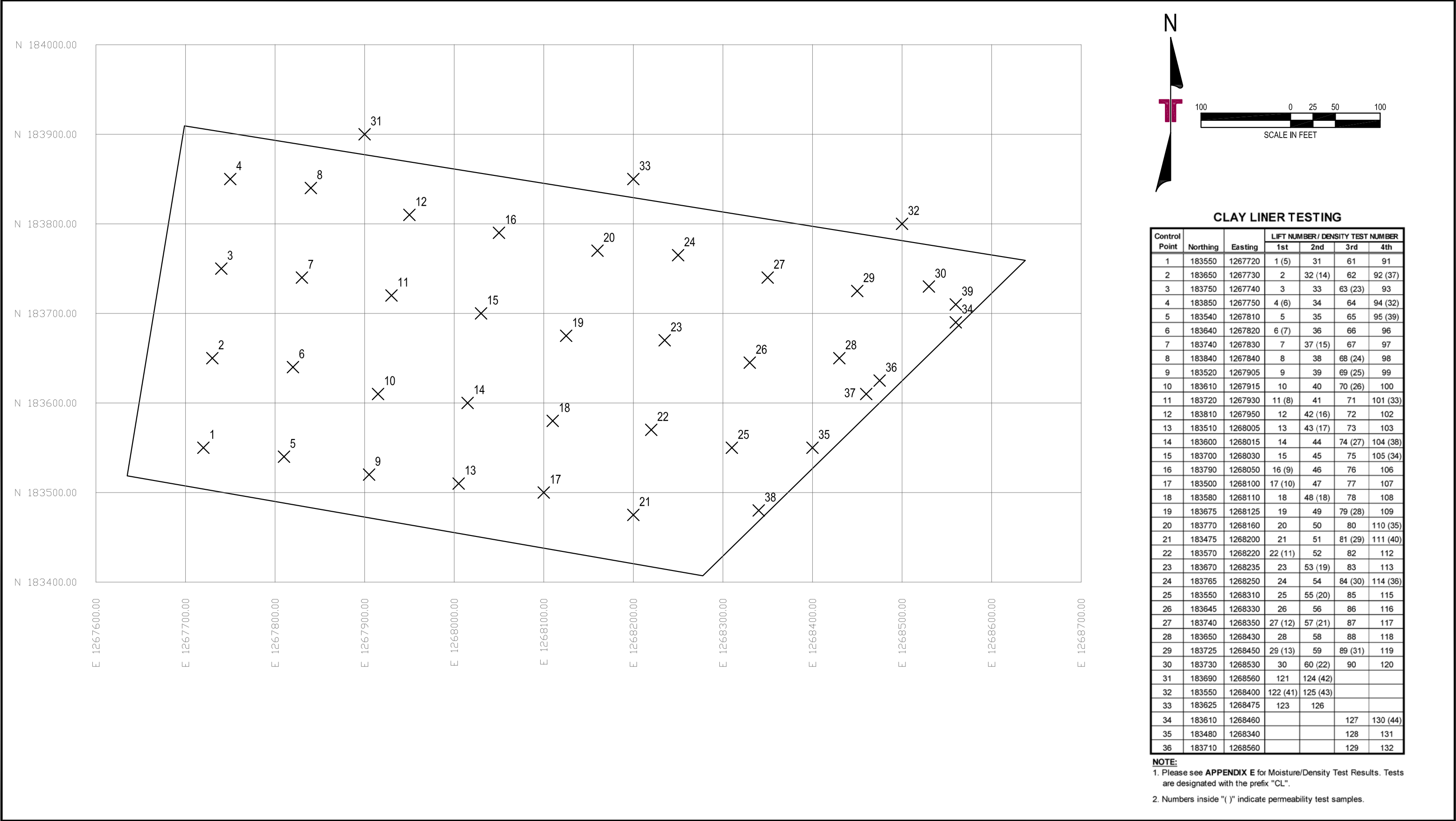
WASTE MANAGEMENT

TWO PINE LANDFILL

NORTH LITTLE ROCK

ARKANSAS

FIGURE 4	
DESIGNED BY:	BNF
DRAWN BY:	JDW
APPVD. BY:	BNF
SCALE:	1" = 100'
DATE:	09-11-09
JOB NO.	062-015-35097116
ACAD NO.	005
SHEET NO.:	4 OF 5



REV.	DATE	BY	DESCRIPTION

Terracon

Consulting Engineers and Scientists

25809 I-30 SOUTH

PH. (501) 847-9292

BRYANT, AR 72022

FAX. (501) 847-9210



FIELD TEST LOCATIONS - CLAY LIFTS

CONSTRUCTION QUALITY ASSURANCE - CELL 3

WASTE MANAGEMENT

TWO PINE LANDFILL

NORTH LITTLE ROCK

ARKANSAS

FIGURE 5	
DESIGNED BY:	BNF
DRAWN BY:	JDW
APPVD. BY:	BNF
SCALE:	1" = 100'
DATE:	09-11-09
JOB NO.	062-015-35097116
ACAD NO.	004
SHEET NO.:	5 OF 5

4.0 GEOSYNTHETIC LINER INSTALLATION

Installation of the geosynthetic liners for the bottom liner system of Cell 3 occurred during August 2009. Approximately 358,080 square feet of 60-mil textured HDPE geomembrane liner and 8-ounce double-sided geocomposite were placed in Cell 3. The geosynthetics installer information for TEP is provided in APPENDIX G. A layer of geosynthetic clay liner (GCL) was placed in the Cell 3 sump area prior to placement of two layers of 60-mil HDPE geomembrane.

4.1 MANUFACTURER'S QUALITY CONTROL CERTIFICATES

Manufacturer's Quality Control Certificates (roll certification reports) were submitted for comparison of the delivered material properties with the project specifications. Copies of the manufacturer's certificates for the GCL and geomembrane are provided in **APPENDIX H** and **APPENDIX I** respectively. The manufacturer's certificates for the geocomposite are provided in **APPENDIX T**. An inventory of the geomembrane, geocomposite, and geotextile used at the site is included in **APPENDIX K**. Based upon the manufacturer's quality control certificates, the supplied materials comply with the project specifications.

4.2 MATERIAL CONFORMANCE TESTING

A copy of the laboratory conformance test results on the geomembrane is included in **APPENDIX J** and a copy of the laboratory conformance test results on the geocomposite is included in **APPENDIX U**. Based upon the results of the conformance testing by TRI, the geomembrane and geocomposite supplied comply with the project specifications.

4.3 DEPLOYMENT OF GEOSYNTHETICS

Prior to the deployment of the geomembrane, the TEP field manager and the earthwork contractor representative accepted the subgrade. A copy of the subgrade acceptance forms are included in **APPENDIX M**.

Deployment of the panels was accomplished by use of a Track-hoe, Sky Track, and manual labor to transport each panel into place. A Terracon field representative monitored the deployment of panels. The daily deployment logs for the geomembrane can be found in **APPENDIX N**. Panel layouts of the bottom liner system for Cell 3 are illustrated on the as-built drawing located in **APPENDIX A**.

Terracon field representatives reviewed each panel and noted any manufacturing and deployment defects for repair. The panels were anchored temporarily with sandbags to prevent wind damage. The panels were permanently anchored at the top of the slopes by anchor trenches filled and compacted with clay. An overbuild area was constructed on the north and west side of Cell 3 to allow for future cell expansion. Plywood was placed over the 60-mil geomembrane and clay material was placed over the plywood.

4.4 GEOMEMBRANE TRIAL SEAM MONITORING

Prior to startup of each seaming period (in the morning and after lunch), the fusion and extrusion welder operators were required to prepare a trial seam. The seams were tested in the field on a gauged tensiometer to check for machine failures or operator errors. **APPENDIX L** contains the calibration certificate for the geosynthetic installation field tensiometer. If the tests passed (in peel and in shear), the operator was then allowed to begin seaming. Trial seam logs are presented in **APPENDIX O**. The seams were checked for peel and shear. The coupons were required to exhibit a film tear bond (FTB) and to meet the project specifications for peel and shear strength in order to be acceptable.

4.5 GEOMEMBRANE SEAM MONITORING

The primary seaming method used for joining geomembrane panels was through an automated double track fusion welder. Extrusion welding was used for patches, repairs, intersections of fusion seams, and seam reconstruction. Monitoring of the seaming methods consisted of periodic visual observation of the seaming process, visual examination of the completed seam, and verification that the seam was welded for its entire length. **APPENDIX P** presents a summary of the panel seaming. Seaming imperfections were marked and subsequently repaired in accordance with the project CQA plan. The geomembrane panel layouts showing seam locations are presented on the as-built drawing in **APPENDIX A**.

4.6 NON-DESTRUCTIVE SEAM TESTING AND REPAIR MONITORING

Continuity testing on seams, seam repairs, and patches were non-destructively tested by the installer using an air pressure test for fusion welds or vacuum box techniques for extrusion welds. Terracon field CQA personnel monitored and documented field testing of the seams to ensure that the tests were performed in accordance with the project CQA plan. Summaries of the geomembrane continuity testing are presented in **APPENDIX Q**. The location, size, and testing results of seam repairs and patches were documented. Copies of this documentation can be found in **APPENDIX S**.

4.7 DESTRUCTIVE SEAM STRENGTH TESTING

Each destructive sample was divided into three sections: a sample for field testing, a sample for laboratory testing, and an archive sample. Prior to sending the samples to TRI Environmental, Inc. (TRI), they were tested in the field for peel and shear by TEP using a gauged tensiometer. Summaries for the field destructive sampling and laboratory testing for peel and shear are located in **APPENDIX R**. Destructive samples were obtained at a minimum frequency of one sample per 500 linear feet of production seam length. One of the 34 destructive tests (DS-31) failed in the laboratory. Therefore, two additional samples (DS-31A and DS-31B) were taken. Both samples passed laboratory testing. The destructive test locations are noted on the as-built drawing located in **APPENDIX A**. Based on the results of the seam peel and shear testing performed by TEP and TRI, each seam complies with the project specifications.

5.0 LEACHATE COLLECTION SYSTEM AND PROTECTIVE COVER

The leachate collection system consists of a geocomposite overlying the HDPE liner with a minimum of a two-percent slope to a leachate collection trench.

5.1 LEACHATE COLLECTION PIPE

A leachate collection pipe was installed in the center of the Cell 3 bottom liner system. The collection pipe consists of a six-inch diameter perforated HDPE pipe wrapped in a gravel protective/drainage bed. The gravel consists of washed gravel with a gradation varying from No. 4 to 1½ inches in diameter. **TABLE 4** presents the results of laboratory testing of the gravel. The gravel was wrapped with an eight ounce filter fabric to protect the system from clogging. The collection pipe gravity drains at one percent slope into a sump located at the east end of Cell 3. **APPENDIX V** presents the laboratory test results on the gravel and geotextile used in the drainage system.

5.2 LEACHATE PUMP SYSTEM

Two 18-inch diameter HDPE side slope riser pipes were installed in the sump and up the eastern side slope of Cell 3. The pumps were installed within the riser pipes. The liquid in the sump is pumped through a 3-inch by 6-inch diameter dual contained force main to three 20,000 gallon double wall storage tank systems that are located in the maintenance area. See **APPENDIX W** for material supplier information regarding the leachate pumps and leachate collection tanks.

5.3 PROTECTIVE COVER SOIL

An 18-inch (min) thick sand protective cover layer was placed on top of the geocomposite on the bottom and side slopes of Cell 3. **APPENDIX V** presents the laboratory test results on the sand protective cover layer. **TABLE 5** presents the results of laboratory testing of the sand protective cover. The survey record drawing provided in **APPENDIX A** illustrates the top of the protective cover layer. The layer was placed using low ground pressure dozers while maintaining an 18-inch thick minimum working surface to ensure protection of the underlying geosynthetic liner.

TABLE 4. LEACHATE COLLECTION GRAVEL TEST SUMMARY

Test Description	Calcium Carbonate (%)	Particle Size Analysis ASTM D1140, D422	Soils Classification (USCS)	Permeability (cm/sec)
Project Requirements	<15	< 5% passing No. 200 sieve	GP	1.0×10^{-2}
Sample Number	Test Results			
PG-1 (Pre-construction)	0.20	0.3% passing No. 200 sieve	GP	5.59×10^{-1}
CG-1 (Construction)	N/A	0.5% passing No. 200 sieve	GP	2.75×10^{-1}

TABLE 5. PROTECTIVE COVER SAND TEST SUMMARY

Test Description	Calcium Carbonate (%)	Particle Size Analysis ASTM D1140, D422	Soils Classification (USCS)	Permeability (cm/sec)
Project Requirements	NA	$\leq 5\%$ passing No. 200 sieve	SP	1.0×10^{-5}
Sample Number	Test Results			
PS-1 (Pre-construction)	NA	5.0% passing No. 200 sieve	SP-SM	1.81×10^{-2}
CS-1 (Construction)	NA	2.4% passing No. 200 sieve	SP	2.10×10^{-2}
CS-2 (Construction)	NA	0.9% passing No. 200 sieve	SP	3.40×10^{-2}

APPENDIX A
AS-BUILT DRAWINGS

CERTIFICATION

I HEREBY CERTIFY THIS DRAWING AND INFORMATION SHOWN HEREON WAS TAKEN FROM FIELD SURVEYS MADE BY ME OR UNDER MY SUPERVISION AND ALL HORIZONTAL AND VERTICAL LOCATIONS ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

Daniel Wayne Hovner
Registered Professional Surveyor #1542

Date:

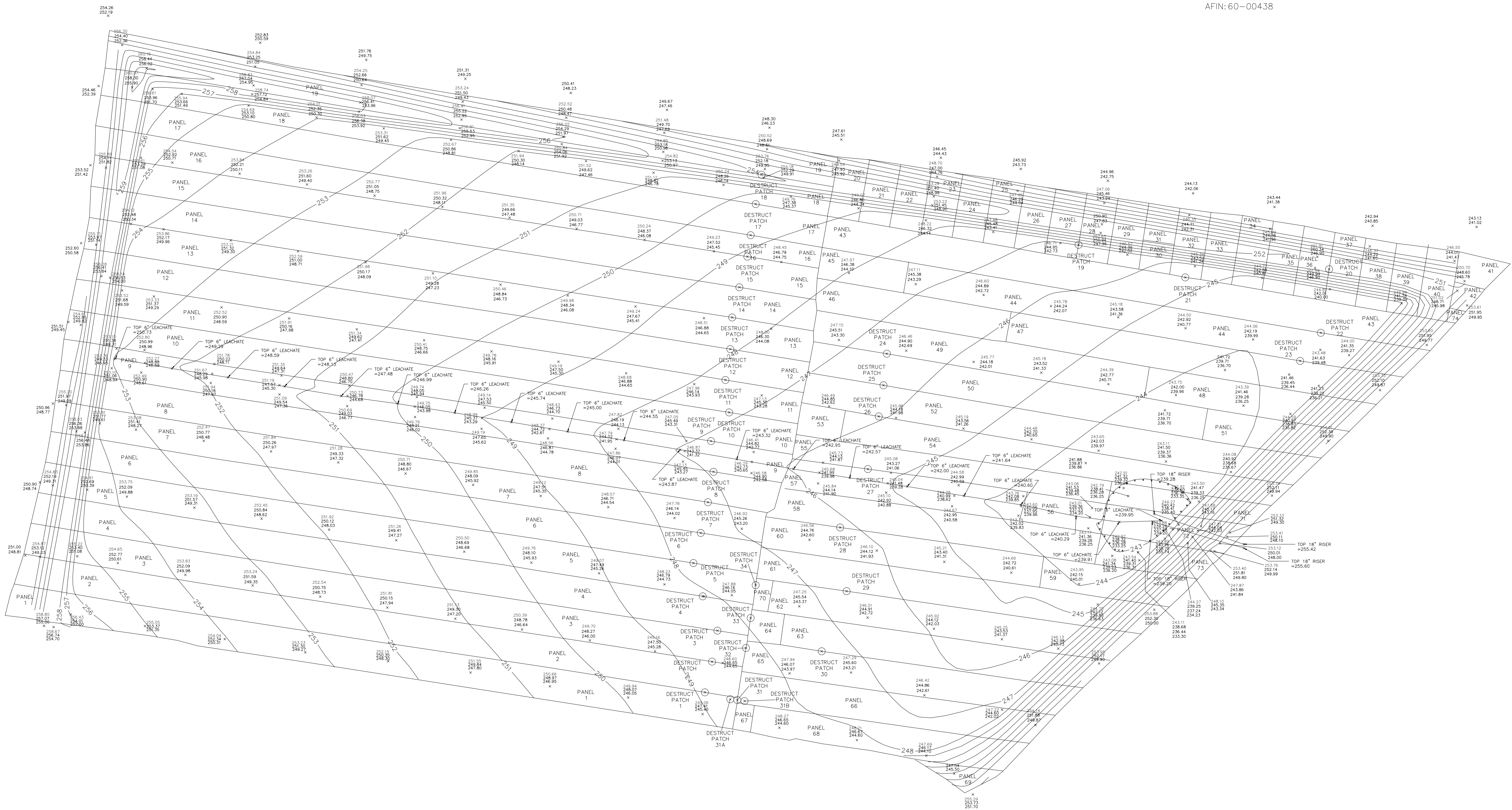
Notes:
ALL DATA IS ASBUILT SURVEYED POINTS.

POINT SETUP
336.50 Top of Protective Cover
X 335.00 Top of Clay Liner
333.00 Top of Subgrade
330.00 Bottom of Engineered Buffer Liner

WASTE MANAGEMENT
TWO PINE LANDFILL CLASS 1 LANDFILL
PERMIT NO. 0163-S1-R3
AFIN:60-00438

VICINITY MAP

F:\Job\CB701542-100261403 2 Pines\2008\Two Pine Expansion\VICINITY MAP.jpg



MAP PREPARED FOR WASTE MANAGEMENT
TWO PINES LANDFILL CELL 3 CONSTRUCTION
PROJECT NO. - 062-015-35087147
CLASS 1 LANDFILL

JACOBS

- CONSULTANTS IN PLANNING,
ENGINEERING, ARCHITECTURE,
CONSTRUCTION MANAGEMENT,
AND RELATED SERVICES
- 1086 EXECUTIVE CENTER DRIVE, SUITE 300
LITTLE ROCK, ARKANSAS 72211
TEL. 501.223.0515 FAX 501.223.2470

DATE: 9-14-09
SCALE: 1:40
DRAWN BY: H. GRAFTENREED
CHECKED BY: M. JOHNSTON
FILE NAME: CB701542.403

APPENDIX B

DAILY PROJECT FIELD RECORDS

DAILY PROJECT FIELD RECORD

DATE: 6/9/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/10/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/11/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (3) Dozers
⇒	⇒ (6) Trucks
⇒	⇒ (2) Trackhoes
⇒	⇒ (1) Sheepsfoot
⇒	⇒ (1) Tractor & Disk
⇒	⇒
⇒	⇒

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/12/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny / Rain later

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/13/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/14/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/15/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/16/09

PROJECT: Two Pine

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast / sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/17/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(3) Dozers
⇒		⇒	(6) Trucks
⇒		⇒	(2) Trackhoes
⇒		⇒	(1) Sheepsfoot
⇒		⇒	(1) Tractor & Disk
⇒		⇒	
⇒		⇒	

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/18/09
PROJECT: Two Pine - Cell 3
LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny
PROJECT NUMBER: 35097116
TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (3) Dozers
⇒	⇒ (6) Trucks
⇒	⇒ (2) Trackhoes
⇒	⇒ (1) Sheepsfoot
⇒	⇒ (1) Tractor & Disk
⇒	⇒
⇒	⇒

TIME	NOTES
7:00	Left home for site.
8:00	Arrive at site. Talked to Mark about the material drying. Took moisture density test in the middle of cell 3. Tests indicated moisture content is near optimum.
9:00	Mark using dozer to clean weeds off East slope. Material being placed in Nw 1/4 of cell 3.
10:30	Moisture density tests not passing in NW 1/4 of cell 3 because of excessive moisture. Danny with Grayco decided to disk area to allow to dry.
11:30	Disking NW 1/4 began.
14:00	Grayco began compacting NW 1/4 of cell 3.
16:30	Moisture density tests in NW 1/4 passed. Tony with smooth roller finished processing this area. NE 1/4 area getting material placed and beginning to be processed.
17:30	Dozer (Bobby) cleaning out muck from SE area that needs to dry before material can be placed there.
18:30	Left site for home.
19:30	Arrived home.

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/22/09
PROJECT: Two Pine - Cell 3
LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny
PROJECT NUMBER: 35097116
TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (4) Dozers
⇒ Surveyor, Gary with Jacobs	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheepsfoot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

TIME	NOTES
6:30	Left office for site.
7:30	Arrived at site. Talked to Bobby about the sump area needing to be mucked out and placing material there to get the 1st lift completed. He was wanting another day of drying. Mark, with dozer, cleaning up dumptruck tracks in the East area of the cell.
9:00	Starting of lift 4 in the SW area of cell 3, placing material from across railroad tracks. Sheeps foot compacting material.
10:00	Surveyor staking out wetlands grading. Robert on trackhoe cleaning up releif channel. He is placing material on the sides of the bank for removal later.
11:00	Perfomed standard on troxler. Made a qucik moisture density test to check moisture. Looked good so I asked Bobby to go ahead and smooth roll area for further testing.
13:30	Moisture density test still high on moisture. Tractor and disk are processing material to dry more.
14:00	SE corner muck now being pushed out to dry. Placement of material in SE corner after muck pushed North of corner.
16:00	Re-disking SW 1/4 of cell 3, processing and drying for proper moisture density.
19:00	Left for home.
20:00	Arrived home.

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/23/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Cloudy

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (4) Dozers
⇒ Surveyor, Gary with Jacobs	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/24/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheepsfoot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/25/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/26/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 6/27/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 6/28/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 6/29/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 6/29/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Matt Shepard

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (4) Dozers
⇒	⇒ (4) Track hoes
⇒	⇒ (6) Dump trucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk
⇒	⇒

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 6/30/09
PROJECT: Two Pine - Cell 3
LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Cloudy
PROJECT NUMBER: 35097116
TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (1) Water truck
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (7) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

TIME	NOTES
6:30	Left home for site.
7:30	Arrived at site. I talked to Tommy, tractor and disk operator, about the condition of lift 6. Moisture wa still high so he redisked the West 1/2 again.
	I talked to Danny about the good progress of the Cell 3 fill. We agreed on pulling the monitor well in the wetlands this afternoon if time permits. Placement of material in the East 1/2, being processed with 815 sheeps foot roller.
10:00	Took moisture density tests lift 6, West 1/3. Took moisture density tests on North edge of Cell 3 lift.
13:00	Placement of fill is slowed due to distance material has to be hauled from across railroad tracks. Hauling of material from relief channel has stopped.
14:00	Danny, Johnny and I pulled the monitor well in the North corner by the property line, the 2" pipe was 60' with an 8" x 10" below the 3' metal casing.
16:00	Disking and processing of 3rd lift, East 1/3, to allow to dry more.
17:00	Grayco crew decided to smooth roll areas disked because storm clouds are quickly approaching from the West.
17:20	Rain started.
17:30	Left site for home.
18:30	Arrived home.

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DAILY PROJECT FIELD RECORD

DATE: 7/1/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (1) Water truck
⇒ Surveyor (Gary)	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (7) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/2/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (1) Water truck
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (7) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/6/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (7) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/7/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/8/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/9/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast/sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(2) Watertrucks
⇒		⇒	(4) Dozers
⇒		⇒	(4) Track Hoes
⇒		⇒	(10) Dumptrucks
⇒		⇒	(1) Sheeps foot roller
⇒		⇒	(1) Smooth roller
⇒		⇒	(1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/10/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/11/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(2) Watertrucks
⇒		⇒	(4) Dozers
⇒		⇒	(4) Track Hoes
⇒		⇒	(10) Dumptrucks
⇒		⇒	(1) Sheeps foot roller
⇒		⇒	(1) Smooth roller
⇒		⇒	(1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/12/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/13/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/16/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/20/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 7/23/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 7/24/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 7/25/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 7/26/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 7/27/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/3/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Foggy/Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (4) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/4/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/6/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (1) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/7/09

WEATHER CONDITIONS: Sunny

PROJECT: Two Pine - Cell 3

PROJECT NUMBER: 35097116

LOCATION: North Little Rock, Arkansas

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

TIME	NOTES
6:30	Left home for site.
	Met with Brad Fureigh about CQA for 59 acre closure.
8:00	Arrived at site.
	Material being placed for West overbuild berm in cell 3. North 1/2 of cell 3 being fine graded with dozer.
8:30	Checked moisture density of engineered buffer at sump area. Moisture is too high for perm or passing test. Performed moisture density tests on the lift of subgrade in cell 3.
10:30	Talked to Danny as West overbuild berm is being constructed and he had questions about tying into cell 1 North berm. He asked to explain area to Brad. I talked to Brad and Ken, Brad said he will come look at area this afternoon. B-stone is being hauled in and stockpiled on maintenance area for road of old landfill.
12:00	Took 10 moisture density tests on proposed haul road (35087052).
14:30	Brad Fureigh arrives to look at West berm and talked to Danny about the process of peeling back the composite and liner to connect to the existing berm of cell 1. Danny understood the process.
14:45	Brad and I talked to Kenneth about proposed haul road and closure project construction schedule for closure project.
16:00	Third lift of EB and sump area cell 3 is being processed for moisture density. Tractor with box blade is being used on top of subgrade for fine grading.
19:00	Left site for home.
20:00	Arrived home.

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DAILY PROJECT FIELD RECORD

DATE: 8/8/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/9/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast/Misty

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/10/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

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DAILY PROJECT FIELD RECORD

DATE: 8/11/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/12/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/13/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/14/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/18/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/19/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Overcast

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

<u>Contractor Personnel on Site:</u>	<u>Contractor Equipment on Site:</u>
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/22/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 8/25/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Joe Smith

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 9/2/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Michael Gombrich

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 9/3/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Michael Gombrich

Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 9/4/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Michael Gombrich

Contractor Personnel on Site:		Contractor Equipment on Site:	
⇒	Grayco	⇒	(2) Watertrucks
⇒		⇒	(6) Dozers
⇒		⇒	(4) Track Hoes
⇒		⇒	(10) Dumptrucks
⇒		⇒	(1) Sheeps foot roller
⇒		⇒	(2) Smooth roller
⇒		⇒	(1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

DAILY PROJECT FIELD RECORD

DATE: 9/7/09

PROJECT: Two Pine - Cell 3

LOCATION: North Little Rock, Arkansas

WEATHER CONDITIONS: Sunny

PROJECT NUMBER: 35097116

TERRACON REP: Michael Gombrich

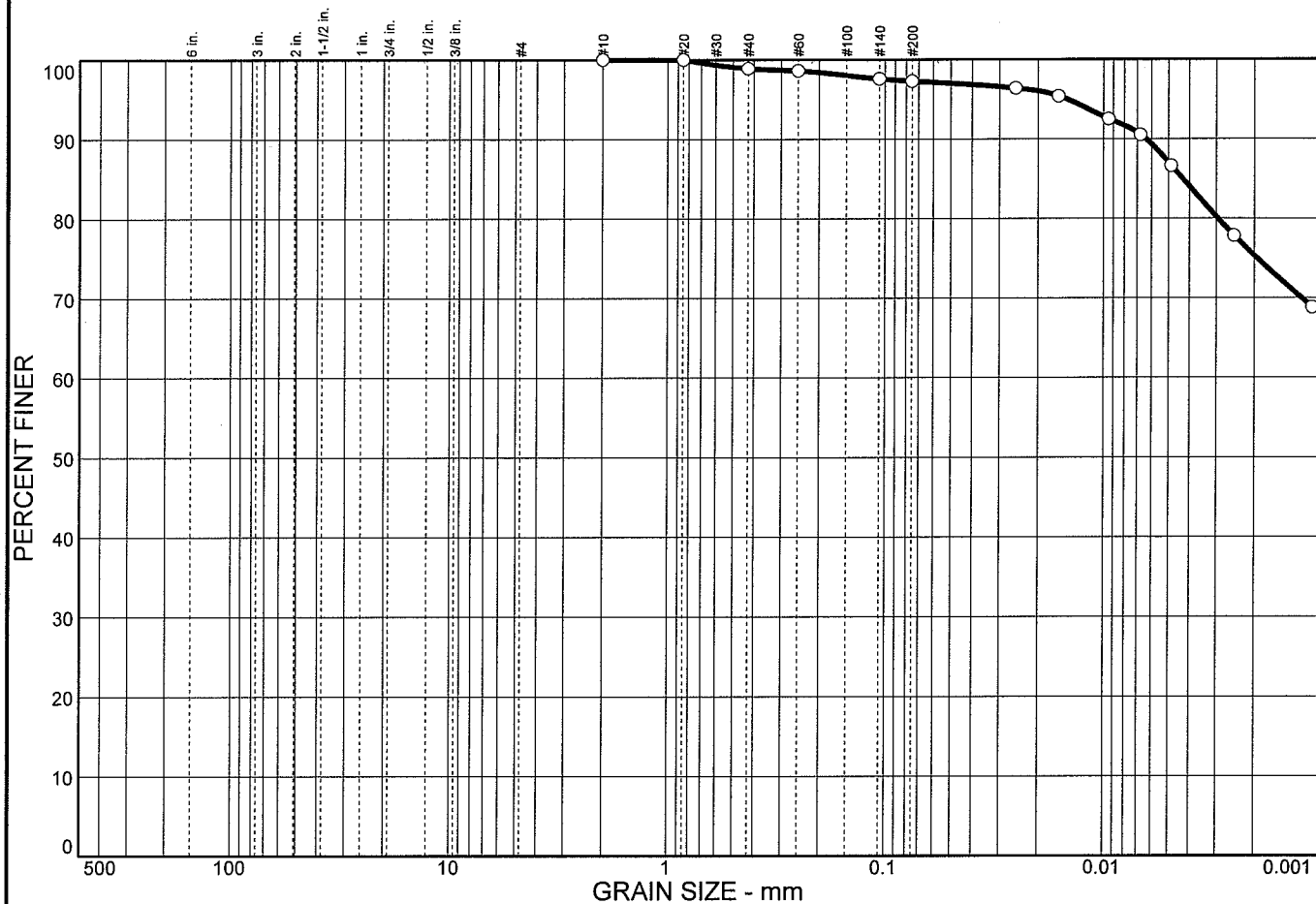
Contractor Personnel on Site:	Contractor Equipment on Site:
⇒ Grayco	⇒ (2) Watertrucks
⇒	⇒ (6) Dozers
⇒	⇒ (4) Track Hoes
⇒	⇒ (10) Dumptrucks
⇒	⇒ (1) Sheeps foot roller
⇒	⇒ (2) Smooth roller
⇒	⇒ (1) Tractor and disk

[illegible]

Note: Copies of all completed "Project Field Record Forms" are to be submitted to the Project Manager at the end of each day and should be maintained with the Project Records.

APPENDIX C
PRE-CONSTRUCTION TESTING – ENGINEERED
BUFFER & CLAY LINER

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.7	10.3	87.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	98.9		
#60	98.6		
#140	97.6		
#200	97.3		

* (no specification provided)

Material Description

Brown Fat clay

Atterberg Limits

PL= 24 LL= 74 PI= 50

Coefficients

D₈₅= 0.0043 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= CH AASHTO=

Remarks

WC=30.6%

Sample No.: S-1
Location:

Source of Sample: PC-2

Date: 6-12-08
Elev./Depth:

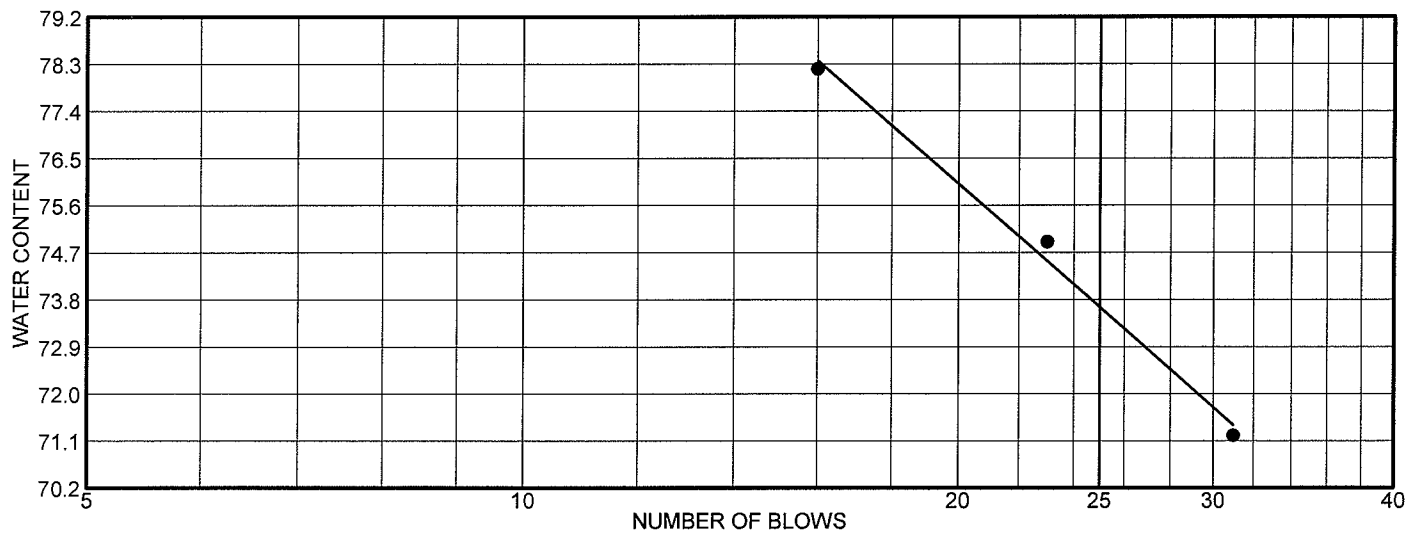
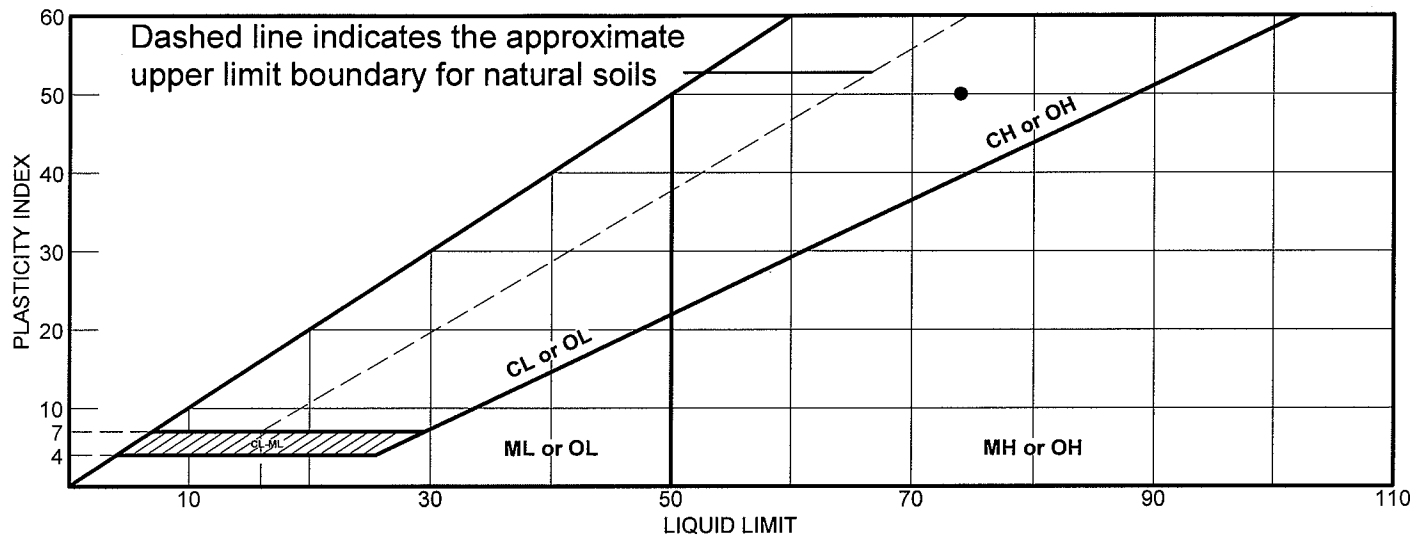
Terracon

Client: TERRACON
Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 5553

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fat clay	74	24	50	98.9	97.3	CH

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: PC-2

Sample No.: S-1

Remarks:

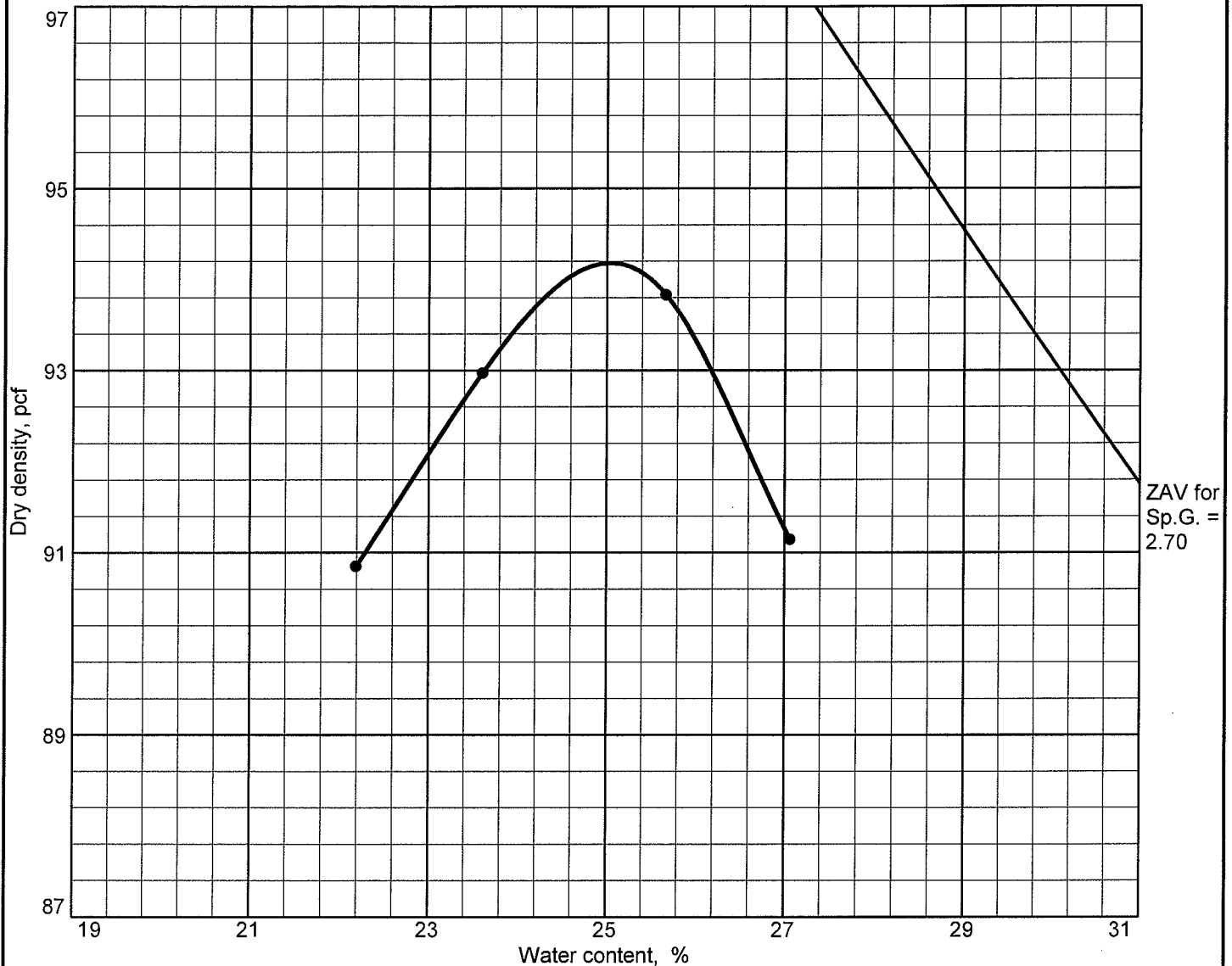
● WC=30.6%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 5553

COMPACTION TEST REPORT



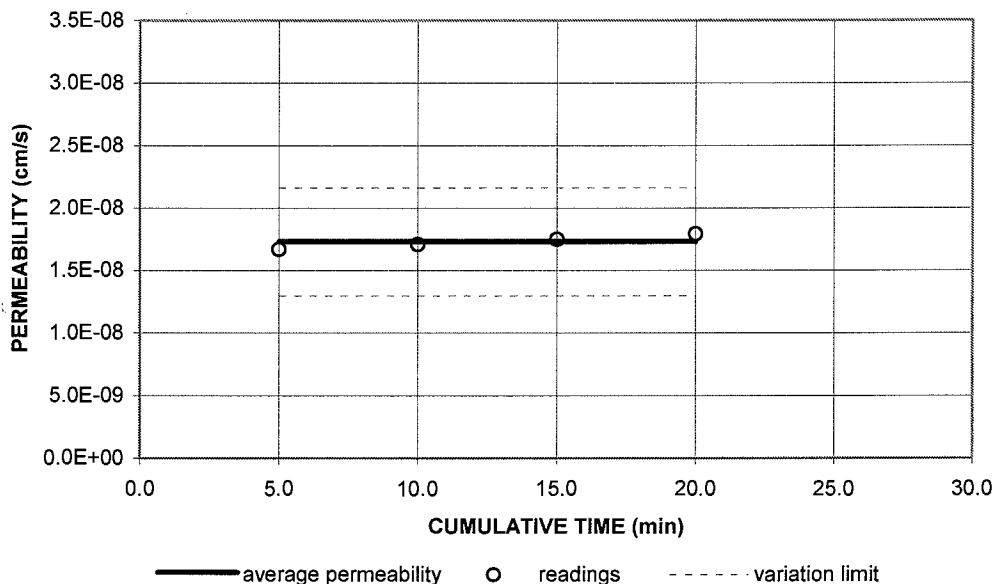
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				74	50	0.0	97.3

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 94.2 pcf Optimum moisture = 25.0 %		Brown Fat clay	
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: PC-2			

Figure 5553

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

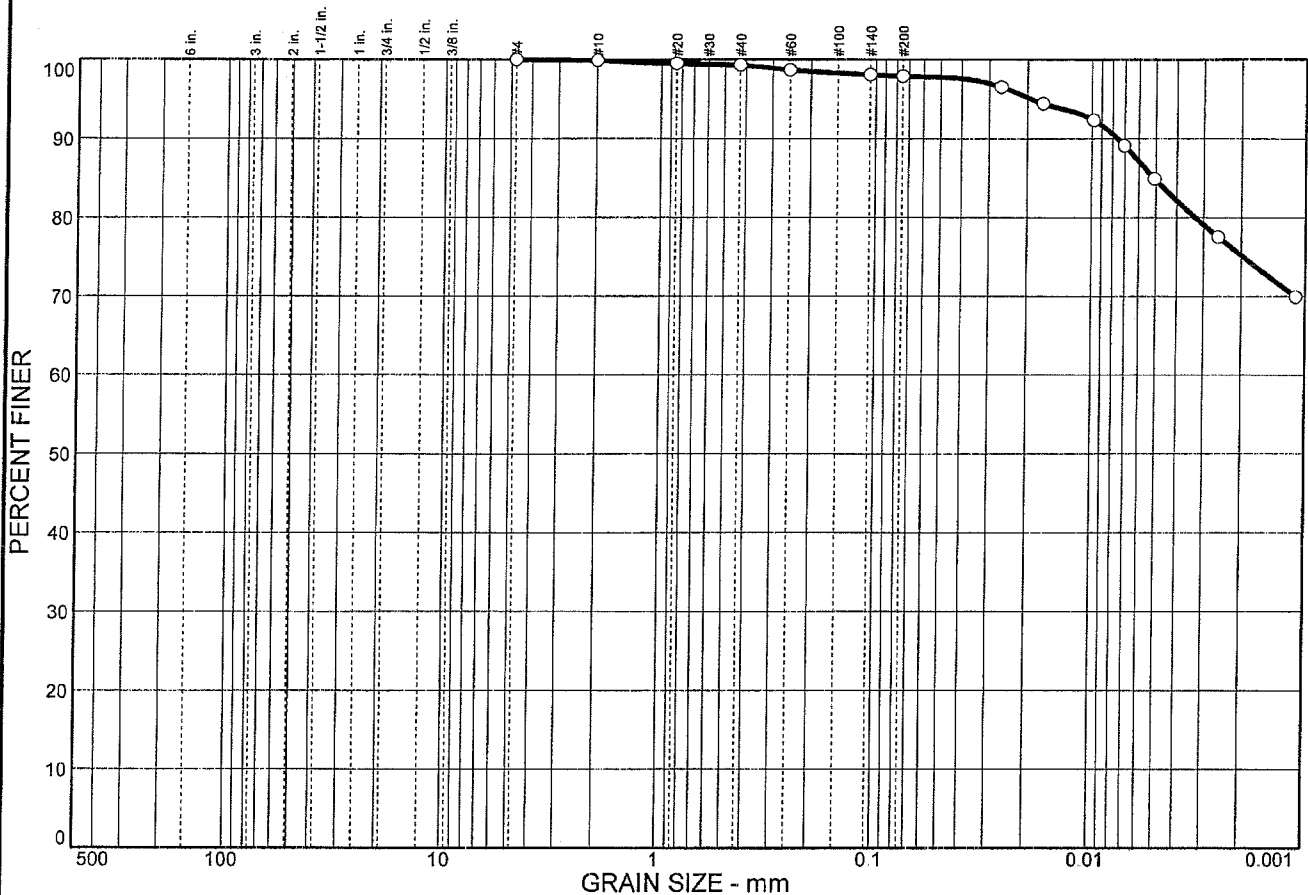
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	12.13	1.67E-08	1.7E-08
21.00	5.00	10.00	11.86	1.71E-08	
21.00	5.00	15.00	11.58	1.75E-08	
21.00	5.00	20.00	11.30	1.79E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	94.2	Specimen Height, (inches)		3.00	3.06
Opti. M.C., (%)	25.0	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		28.12	37.01
% Recompct.	94.9	Percent Saturation (%)		85.84	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		114.55	120.09
Backpressure	90.00	Dry Mass Density (pcf)		89.41	87.65
Cell pressure	100.00	Void Ratio		0.88	1.00
Eff. Stress	10.00	Calculated Porosity, %		46.93	49.98

USCS		LL	PI
Permeant Used:	WATER	Remarks	BROWN FAT CLAY
Project Name	TWO PINE- CELL 1		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35087053	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5553		
Sample Location	PC-2		
Date	6/9/2008	Lab No. 5553	

6/9/2008

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.1	13.2	84.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.5		
#40	99.3		
#60	98.7		
#140	98.1		
#200	97.9		

Material Description
Gray Fat clay

Atterberg Limits
 PL= 35 LL= 79 PI= 44

Coefficients
 D₈₅= 0.0051 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= CH AASHTO=

Remarks
 WC=40.4%

* (no specification provided)

Sample No.: PC-3
Location:

Source of Sample: PC-3

Date: 6-26-08
Elev./Depth:

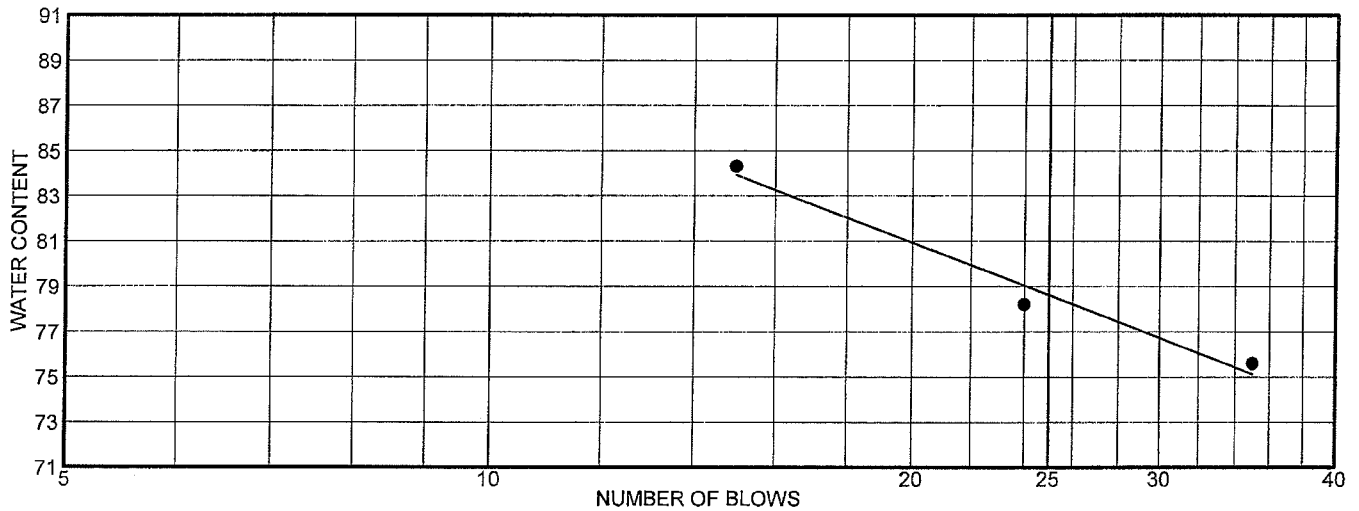
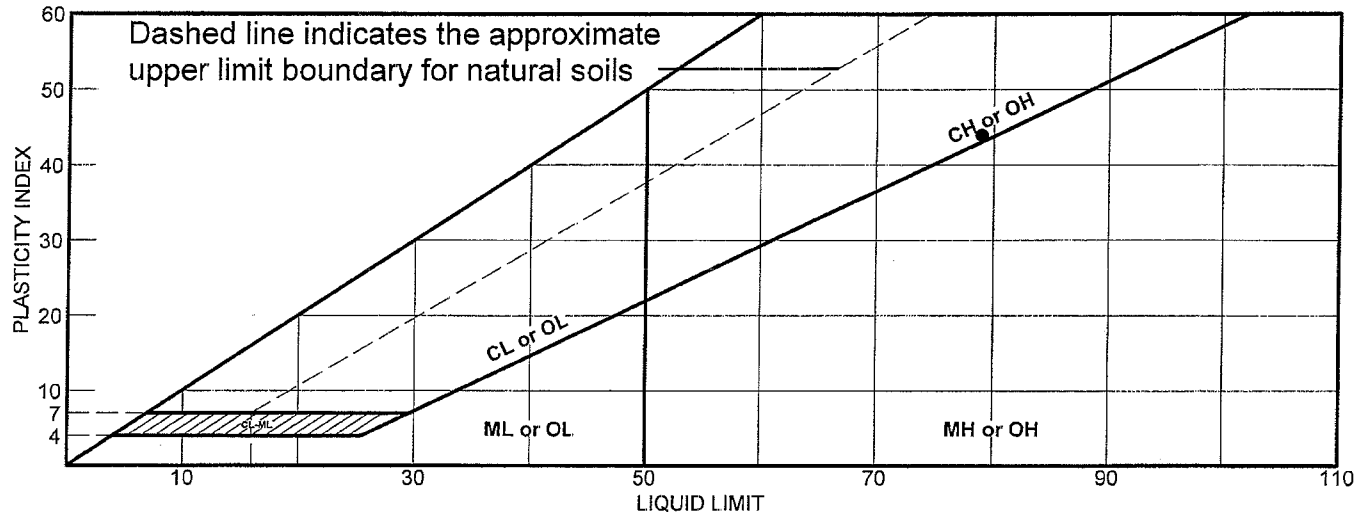
Terracon

Client: TERRACON
Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 6069

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Fat clay	79	35	44	99.3	97.9	CH

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: PC-3

Sample No.: PC-3

Remarks:

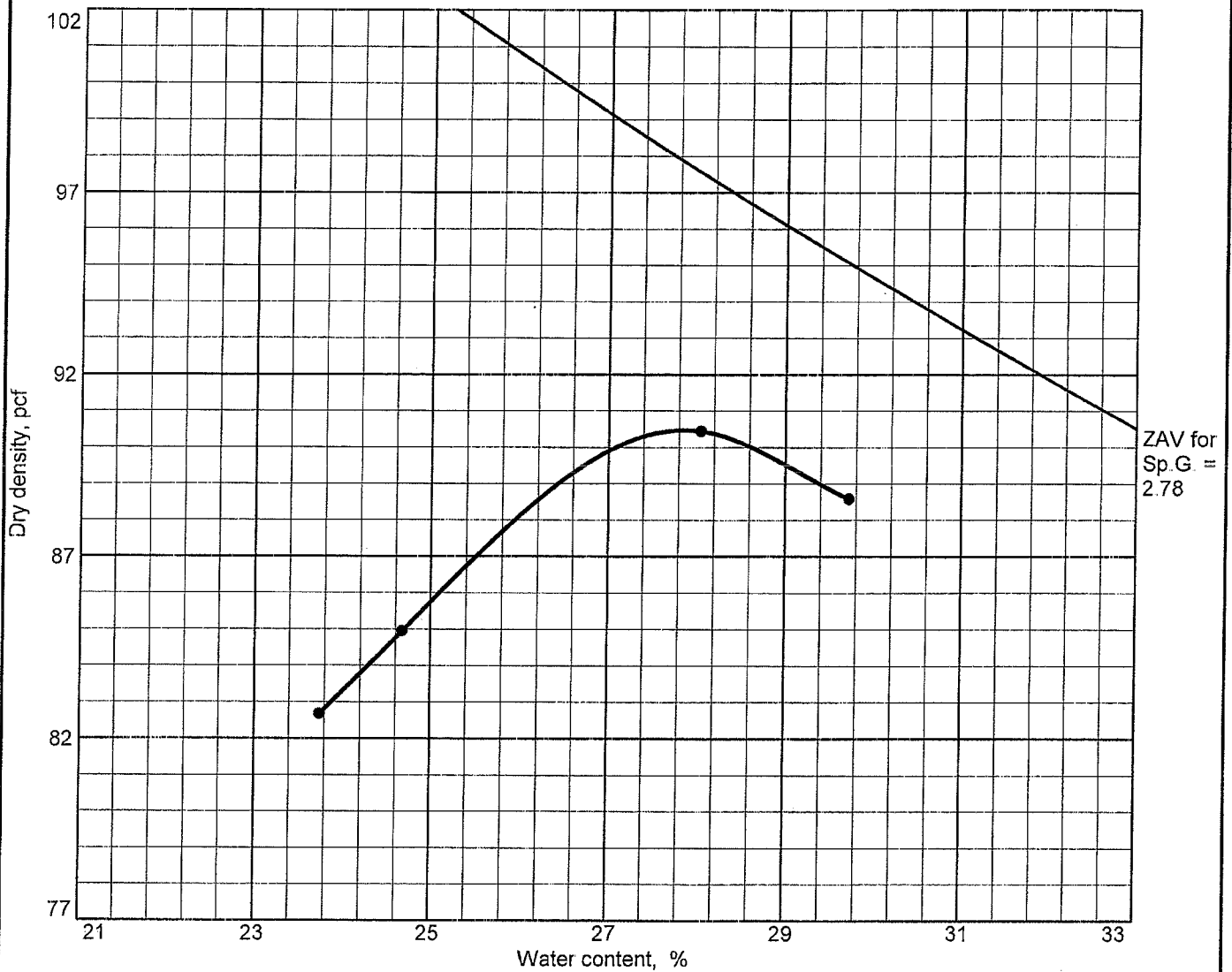
● WC=40.4%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 6069

COMPACTION TEST REPORT



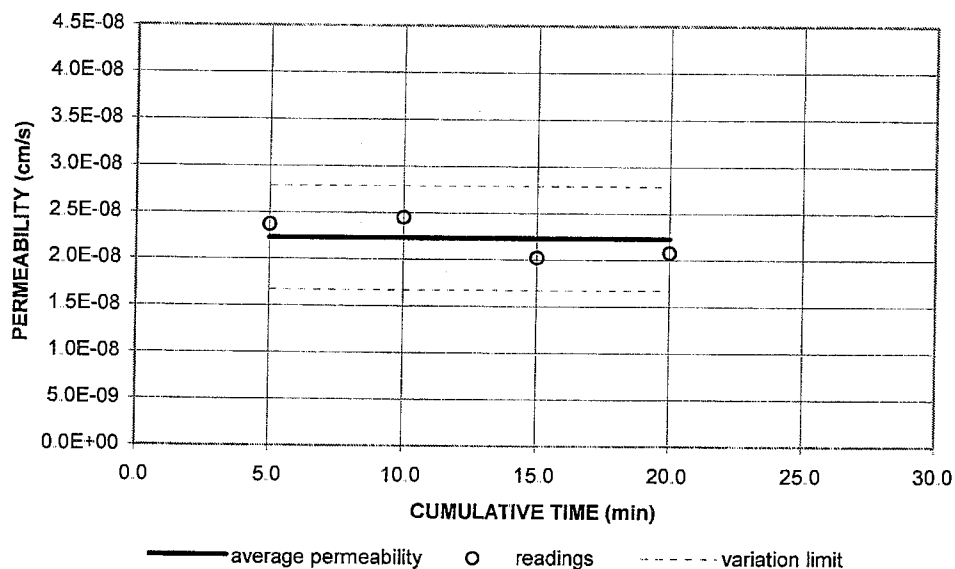
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				79	44	0.0	97.9

TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 90.5 pcf Optimum moisture = 27.9 %		Gray Fat clay
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: PC-3		

Figure 6069

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

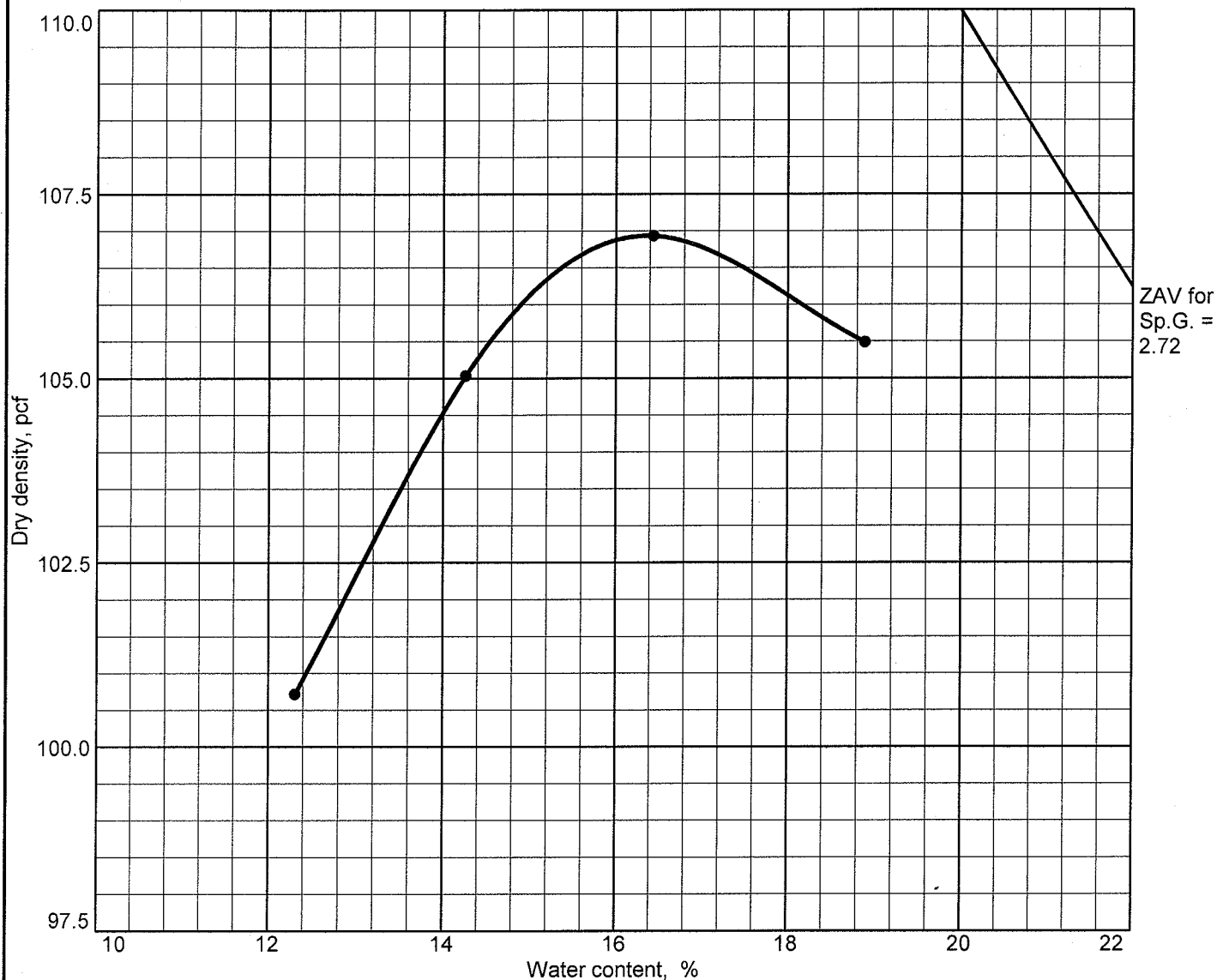
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.17	2.37E-08	2.2E-08
21.00	5.00	10.00	13.71	2.45E-08	
21.00	5.00	15.00	13.34	2.02E-08	
21.00	5.00	20.00	12.97	2.08E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	90.5	Specimen Height, (inches)		3.00	3.08
Opti. M.C., (%)	27.9	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		30.55	38.26
% Recompt.	95.3	Percent Saturation (%)		86.42	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		112.54	116.08
Backpressure	90.00	Dry Mass Density (pcf)		86.20	83.96
Cell pressure	100.00	Void Ratio		0.95	1.03
Eff. Stress	10.00	Calculated Porosity, %		48.84	50.81

USCS	LL	PI
Permeant Used: WATER	Remarks	GRAY FAT CLAY

Project Name WM TWO PINE Client WM W.O.# 35087053 Sample Number PC-3 Sample Location Date 6/23/2008 Lab No. 6069	Tested by FCE Reviewed by TGG FLEXIBLE WALL PERMEABILITY TEST

COMPACTION TEST REPORT

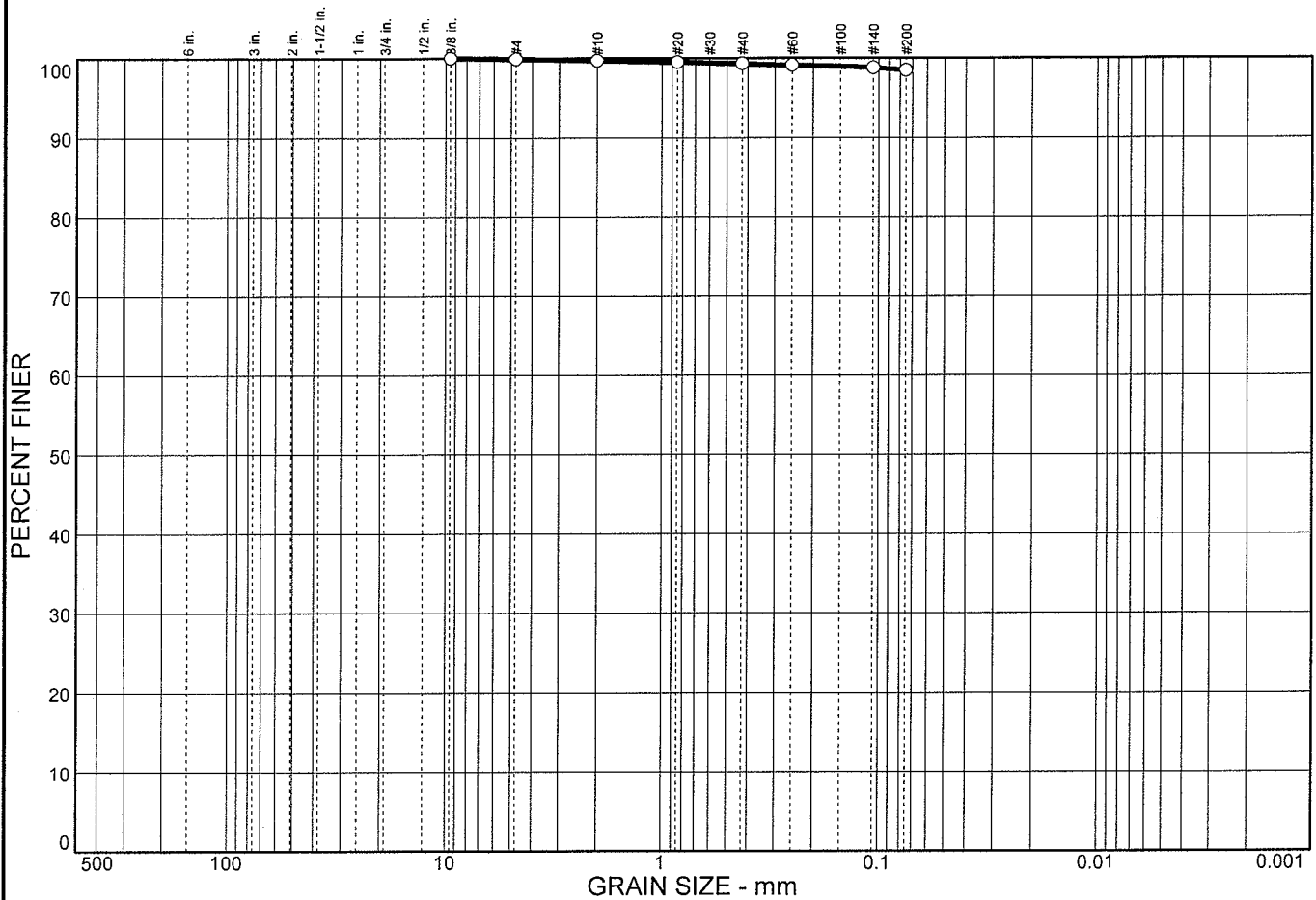


Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CL				37	18	0.0	98.5

TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 106.9 pcf Optimum moisture = 16.4 %		Brown Lean clay
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: 6432 Sample No.: CS-1		Remarks: DATE TYPED 7-8-08 TESTED BY EJ
COMPACTION TEST REPORT 		
		Figure 6432

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	1.4	98.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.9		
#10	99.7		
#20	99.5		
#40	99.3		
#60	99.1		
#140	98.8		
#200	98.5		

* (no specification provided)

Material Description
 Brown Lean clay

Atterberg Limits
 PL= 19 LL= 37 PI= 18

Coefficients
 D₈₅= D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= CL AASHTO=

Remarks
 WC=24.9%

Sample No.: CS-1
Location:

Source of Sample: 6432

Date: 7-8-08
Elev./Depth:

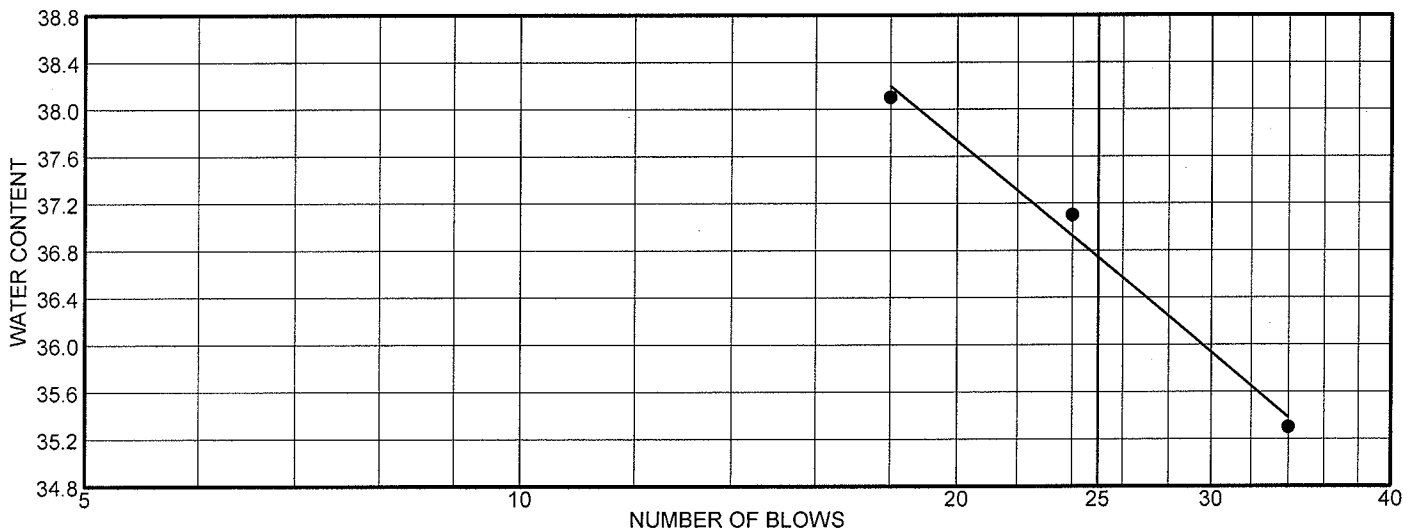
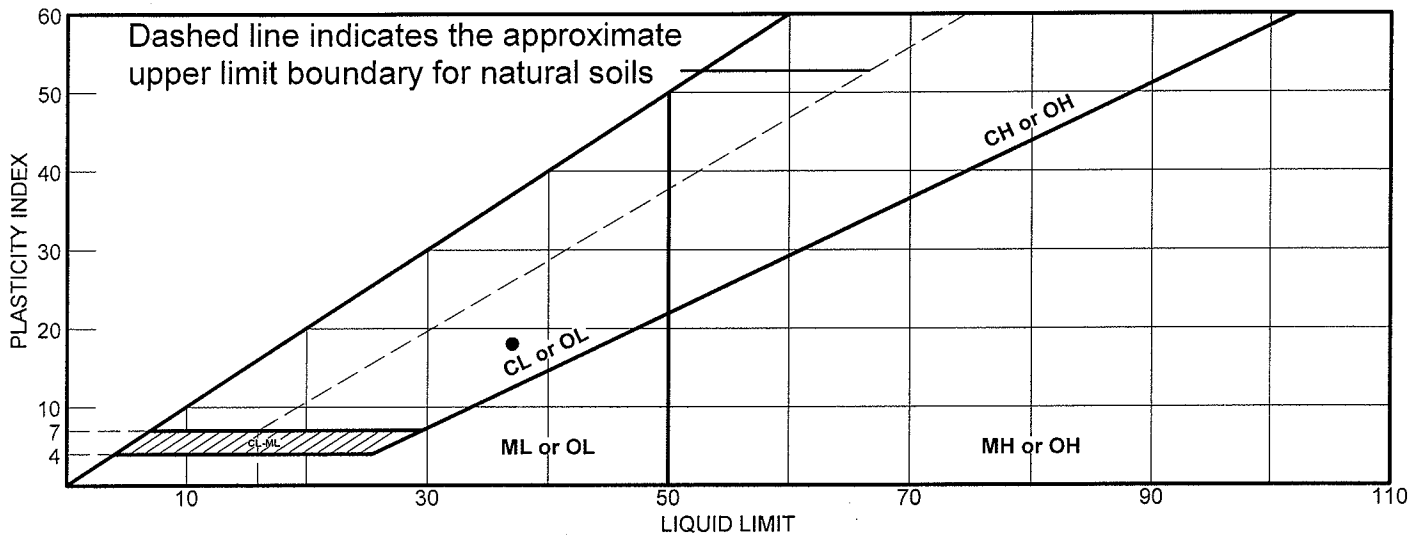
Terracon

Client: TERRACON
Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 6432

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Lean clay	37	19	18	99.3	98.5	CL

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: 6432

Sample No.: CS-1

Remarks:

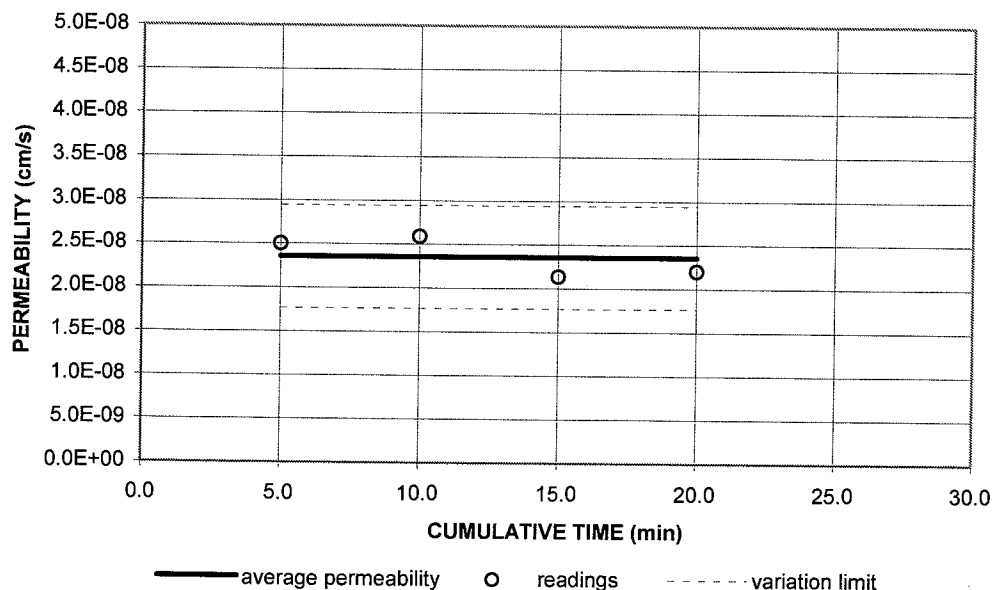
● WC=24.9%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 6432

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.43	2.50E-08	2.4E-08
21.00	5.00	10.00	12.97	2.59E-08	
21.00	5.00	15.00	12.60	2.14E-08	
21.00	5.00	20.00	12.23	2.20E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	106.9	Specimen Height, (inches)		3.00	3.00
Opti. M.C., (%)	16.4	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		19.39	23.64
% Recompt.	95.0	Percent Saturation (%)		79.44	96.86
Test Pressures (psi)		Wet Mass Density (pcf)		121.25	125.57
Backpressure	90.00	Dry Mass Density (pcf)		101.56	101.56
Cell pressure	100.00	Void Ratio		0.66	0.66
Eff. Stress	10.00	Calculated Porosity, %		39.72	39.72

USCS		LL	PI
Permeant Used:	WATER	Remarks	Brown lean clay

Project Name	WM TWO PINE		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35087053	FLEXIBLE WALL PERMEABILITY TEST 		
Sample Number	CS-1					
Sample Location						
Date	7/11/2008	Lab No.	6432			

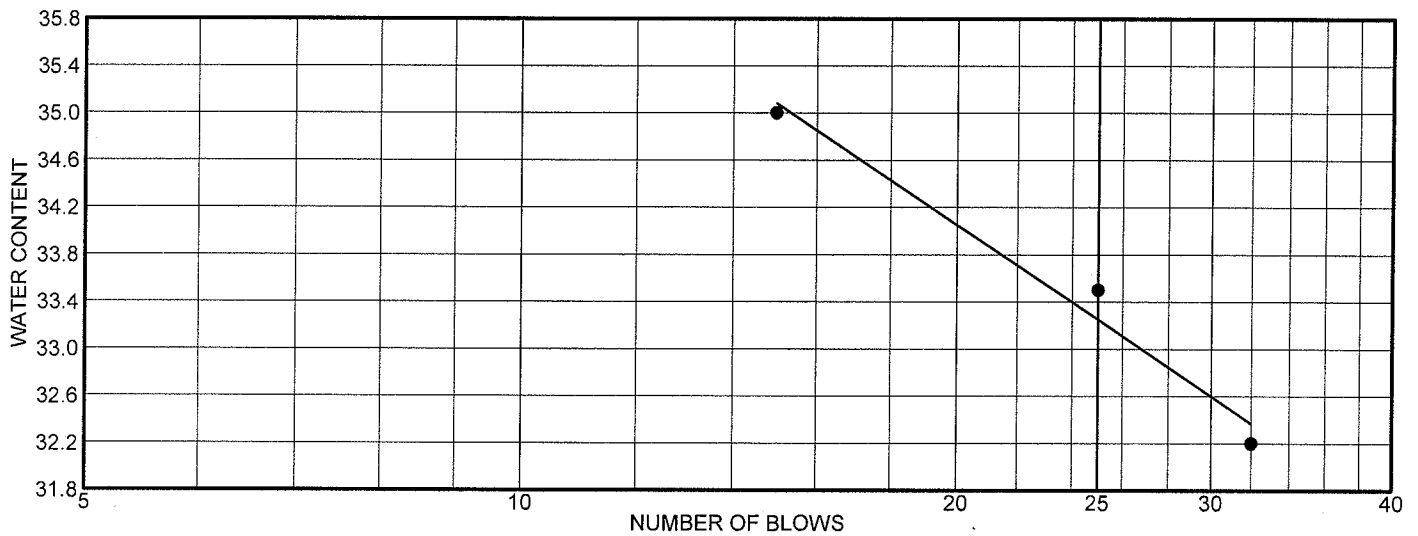
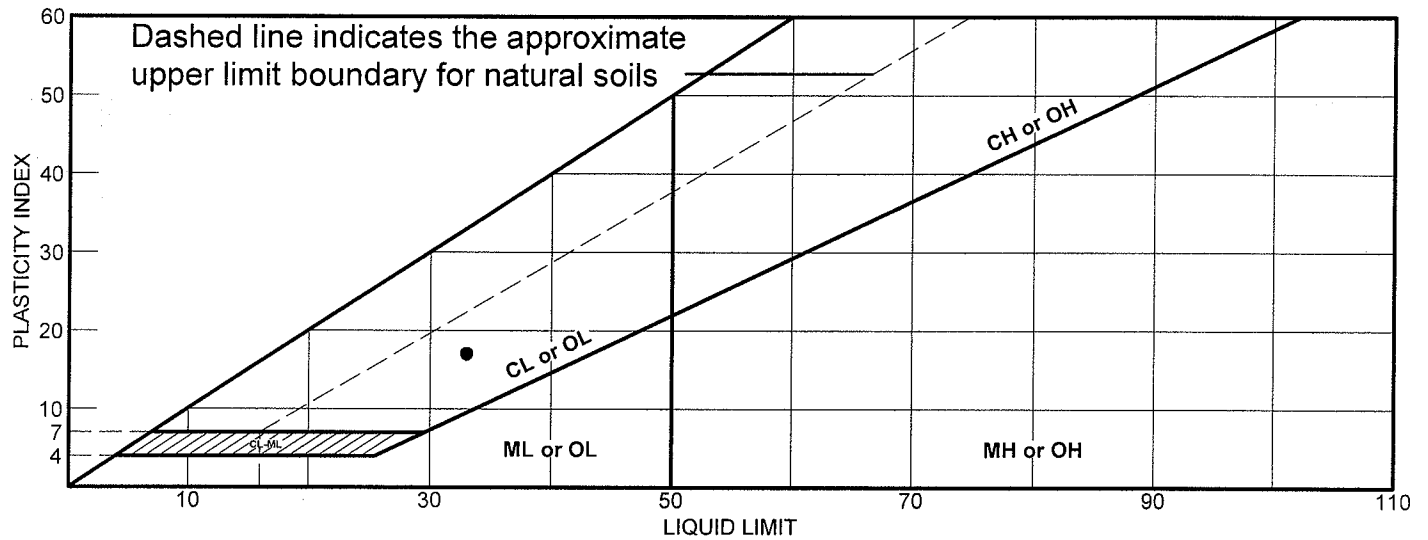
The graph illustrates the grain size distribution of a soil sample. The y-axis represents the percentage of soil finer than a given grain size, ranging from 0 to 100. The x-axis represents the grain size in millimeters, on a logarithmic scale from 500 mm to 0.001 mm. The curve shows that 100% of the soil is finer than approximately 0.075 mm. The distribution is well-graded, with a significant portion of the soil falling between 0.075 mm and 0.001 mm.

Grain Size (mm)	Percent Finer (%)
500	100
100	100
60	100
40	100
30	100
20	100
10	100
7.5	100
6.0	100
4.75	100
3.0	100
2.5	100
2.0	100
1.5	100
1.18	100
0.85	100
0.75	100
0.60	99
0.425	99
0.30	99
0.25	98
0.20	95
0.15	89
0.10	66
0.075	56
0.060	46
0.0425	42
0.030	38
0.025	31
0.020	27

<u>Material Description</u>		
Red-Brown Lean clay		
<u>Atterberg Limits</u>		
PL= 16	LL= 33	PI= 17
<u>Coefficients</u>		
D ₈₅ = 0.0612	D ₆₀ = 0.0236	D ₅₀ = 0.0148
D ₃₀ = 0.0025	D ₁₅ =	D ₁₀ =
C _u =	C _c =	
<u>Classification</u>		
USCS= CL	AASHTO=	
<u>Remarks</u>		
WC=17.5%		

Figure 6758

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red-Brown Lean clay	33	16	17	98.0	88.7	CL

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: 6758

Sample No.: CS-4

Remarks:

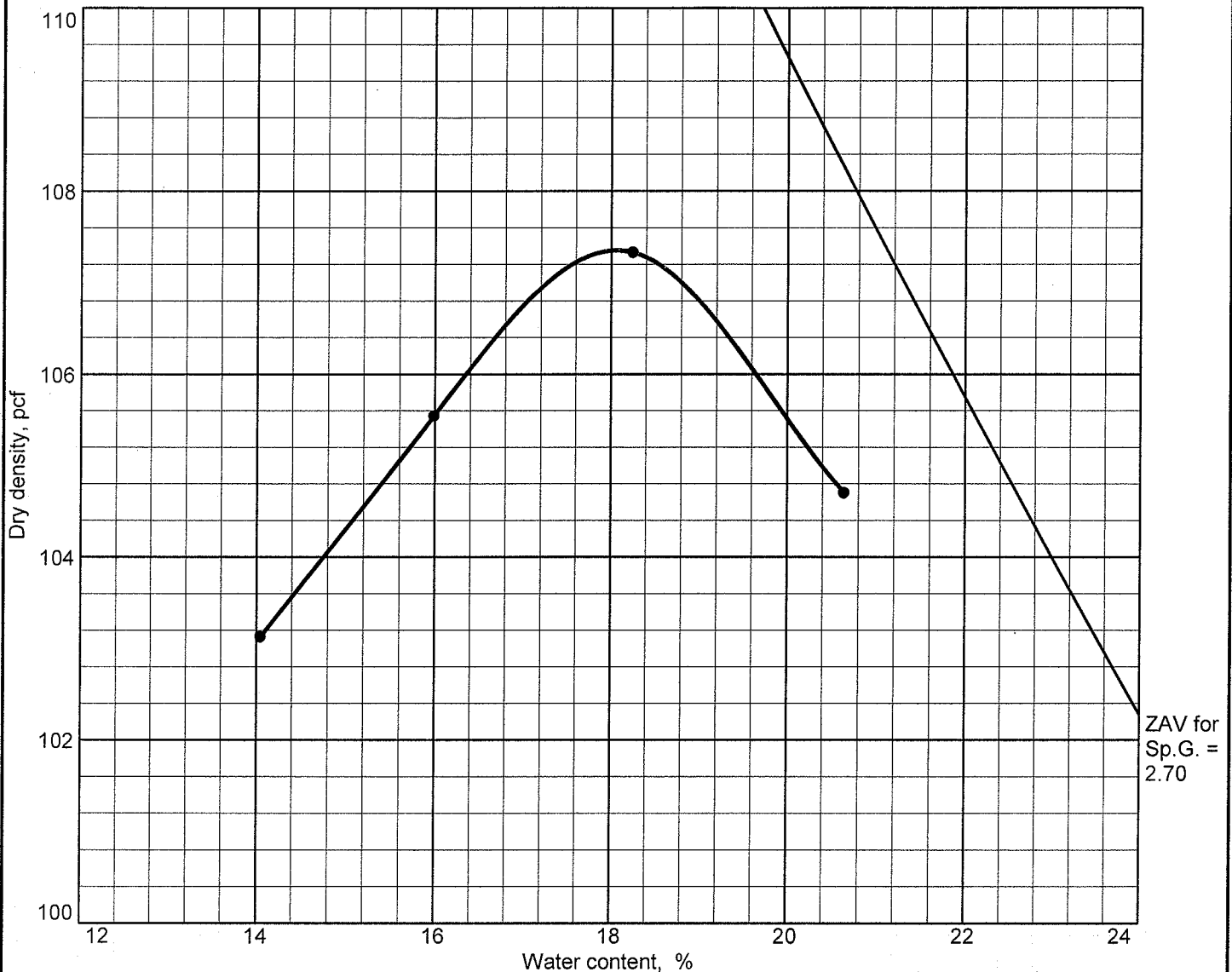
● WC=17.5%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 6758

COMPACTION TEST REPORT



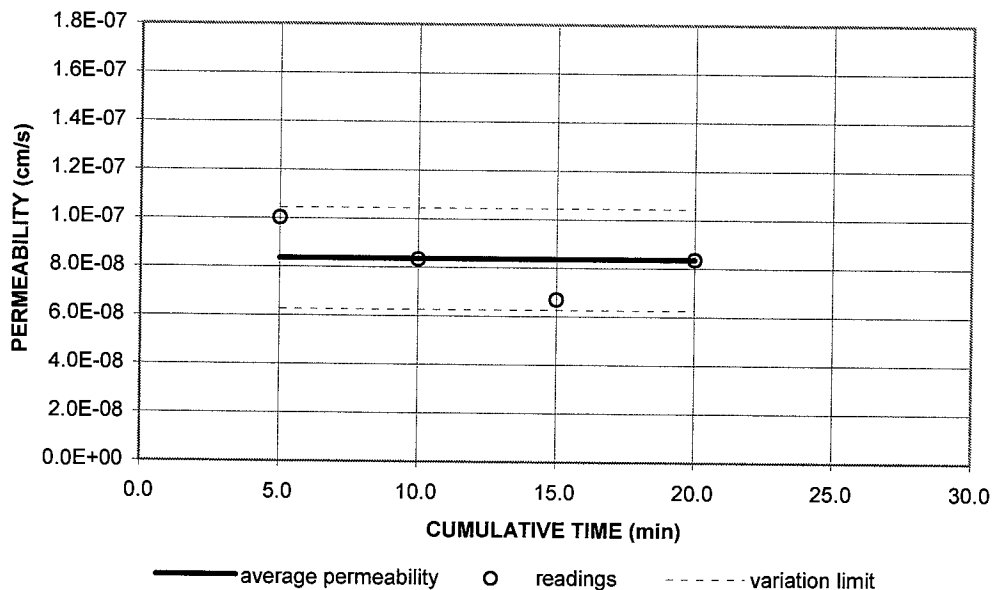
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CL				33	17	0.0	88.7

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 107.4 pcf		Red-Brown Lean clay	
Optimum moisture = 18.1 %			
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: 6758			

Figure 6758

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

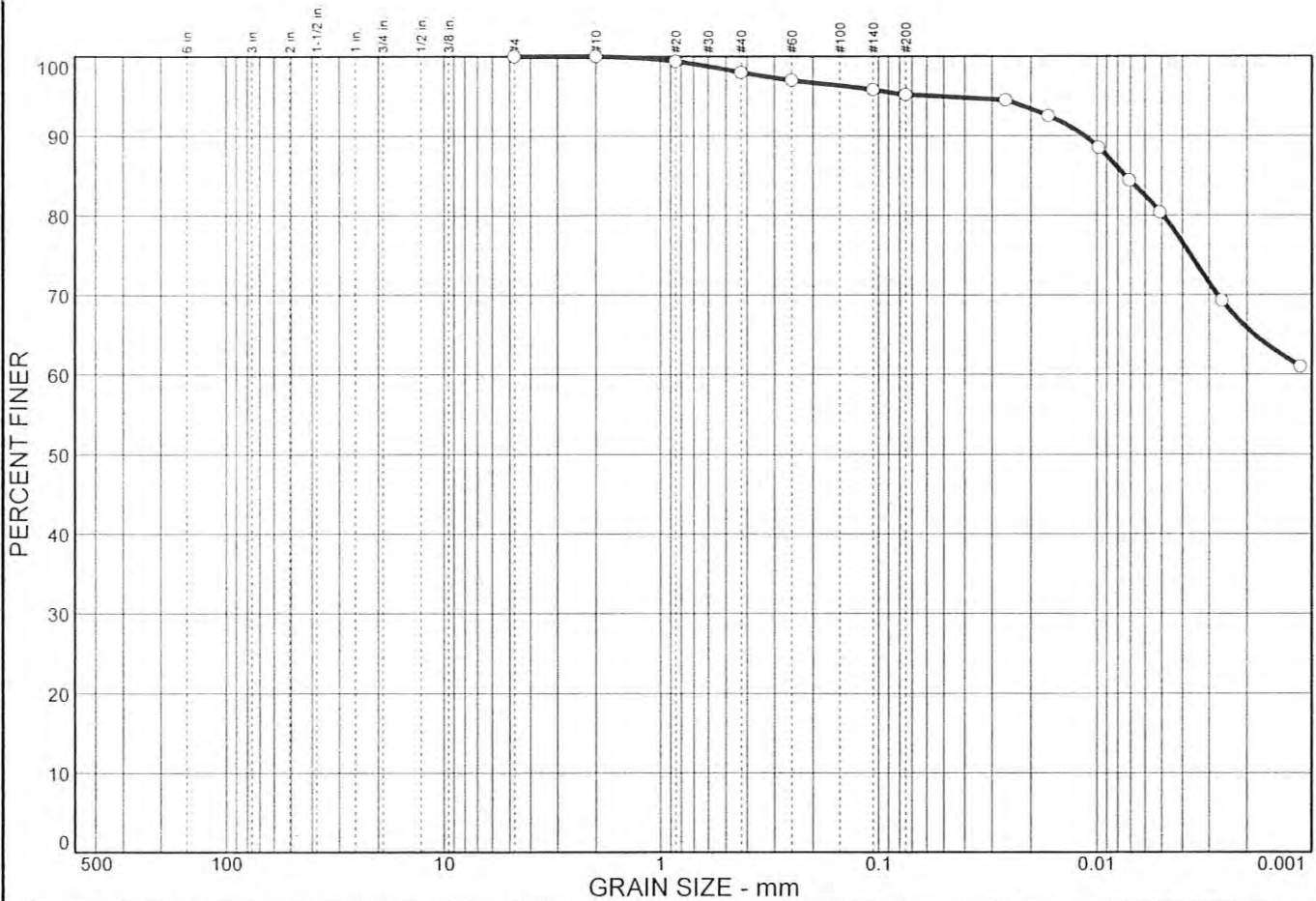
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	9.54	1.00E-07	8.4E-08
21.00	5.00	10.00	8.52	8.33E-08	
21.00	5.00	15.00	7.78	6.71E-08	
21.00	5.00	20.00	6.95	8.36E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	107.4	Specimen Height, (inches)		3.00	2.98
Opti. M.C., (%)	18.1	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		18.31	22.99
% Recompct.	94.8	Percent Saturation (%)		75.55	96.52
Test Pressures (psi)		Wet Mass Density (pcf)		120.49	126.11
Backpressure	90.00	Dry Mass Density (pcf)		101.85	102.53
Cell pressure	100.00	Void Ratio		0.65	0.64
Eff. Stress	10.00	Calculated Porosity, %		39.55	39.14

USCS	LL	PI
Permeant Used: WATER	Remarks	Reddish brown clay

Project Name	WM TWO PINE			Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35087053	FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number	CS-4						
Sample Location							
Date	8/7/2008	Lab No.	6758				

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	4.8	15.1	80.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.4		
#40	98.0		
#60	97.0		
#140	95.8		
#200	95.2		

* (no specification provided)

Material Description

Brown Fat clay

Atterberg Limits

PL= 24

LL= 62

PI= 38

Coefficients

D₈₅= 0.0074

D₆₀=

D₅₀=

D₃₀=

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= CH

AASHTO=

Remarks

WC=17.4%

Sample No.: CS-5

Source of Sample: 7398

Date: 8-8-08

Location:

Elev./Depth:

Terracon

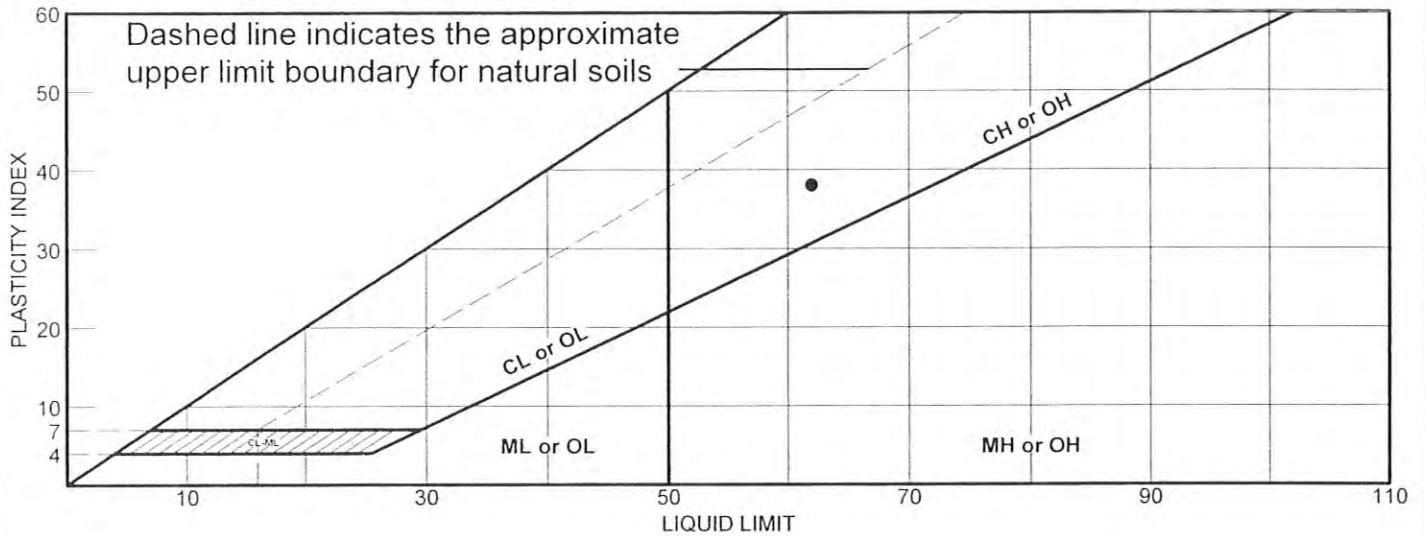
Client: TERRACON

Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 7398

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Fat clay	62	24	38	98.0	95.2	CH

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: 7398

Sample No.: CS-5

Remarks:

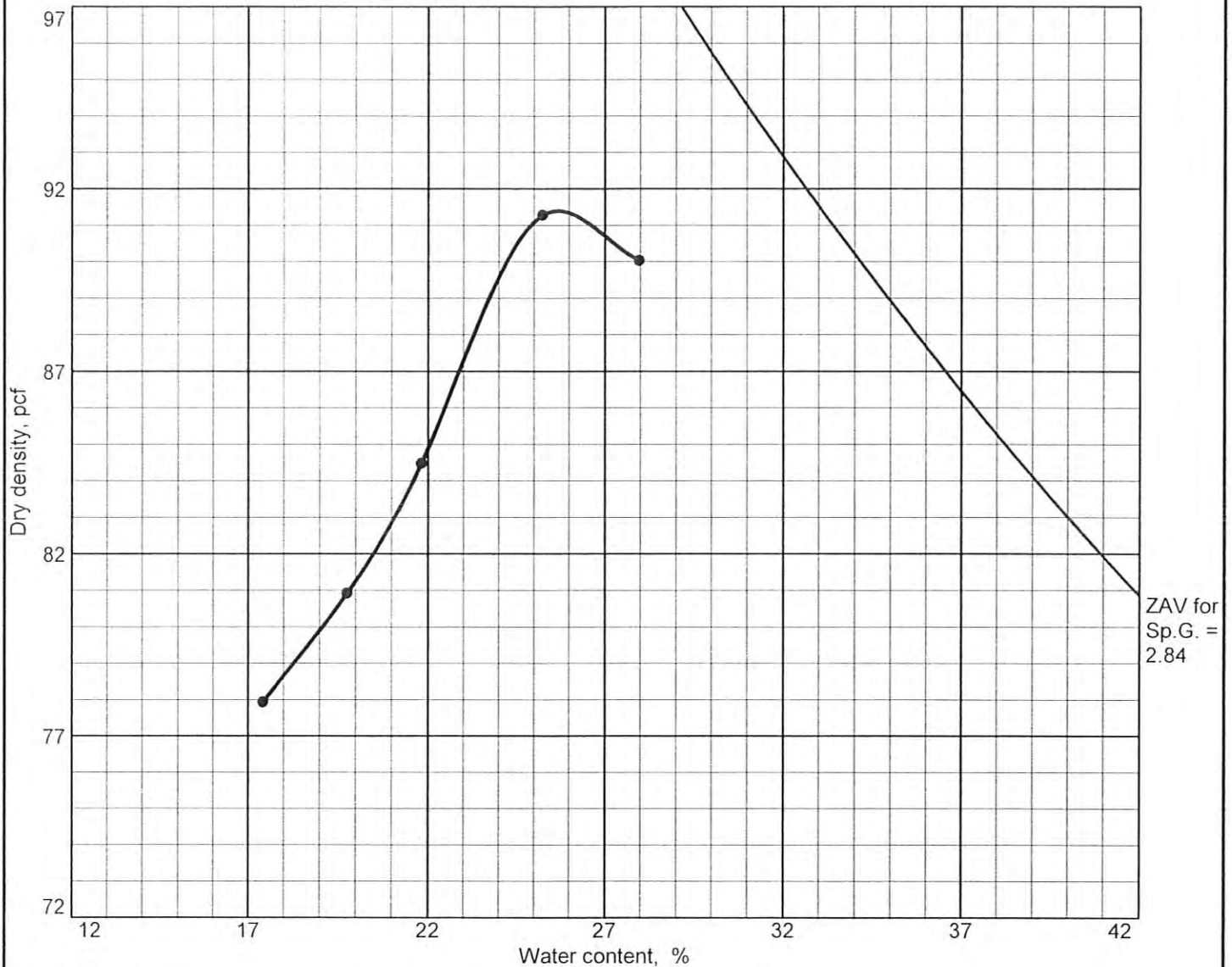
● WC=17.4%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 7398

COMPACTION TEST REPORT

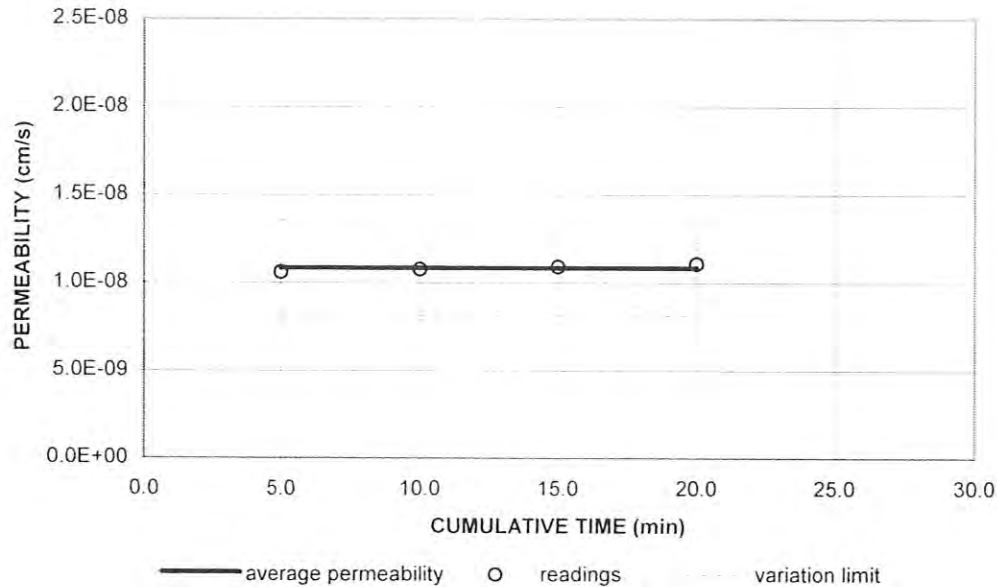


Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				62	38	0.0	95.2

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 91.4 pcf Optimum moisture = 25.7 %		Brown Fat clay	
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: CS-5			

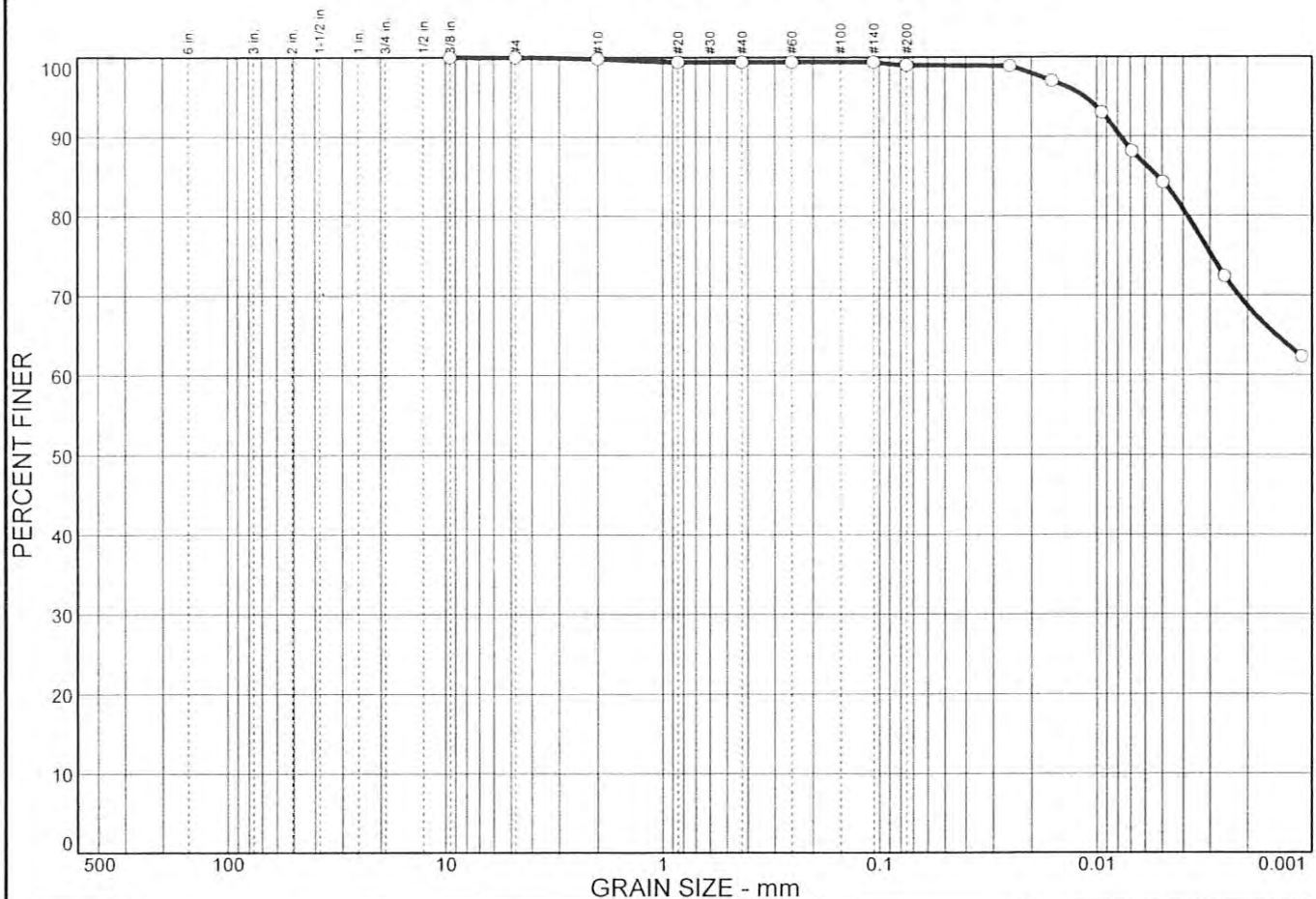
FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	12.78	1.06E-08	1.1E-08
21.00	5.00	10.00	12.60	1.08E-08	
21.00	5.00	15.00	12.41	1.09E-08	
21.00	5.00	20.00	12.23	1.11E-08	
Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	91.4	Specimen Height, (inches)		3.00	3.00
Opti. M.C., (%)	25.7	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		28.93	33.44
% Recompct.	94.8	Percent Saturation (%)		82.75	95.67
Test Pressures (psi)		Wet Mass Density (pcf)		111.75	115.66
Backpressure	90.00	Dry Mass Density (pcf)		86.68	86.68
Cell pressure	100.00	Void Ratio		0.94	0.94
Eff. Stress	10.00	Calculated Porosity, %		48.55	48.55
USCS		LL		PI	
Permeant Used: WATER		Remarks Brown clay			
Project Name	WM TWO PINE		Tested by	FCE	Reviewed by TGG
Client	WM	W.O.# 35087053	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	CS-5				
Sample Location					
Date	8/18/2008	Lab No. 7398			

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	1.0	14.7	84.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	100.0		
#10	99.8		
#20	99.4		
#40	99.4		
#60	99.4		
#140	99.4		
#200	99.0		

* (no specification provided)

Material Description
 Reddish brown Fat clay

Atterberg Limits
 PL= 24 LL= 69 PI= 45

Coefficients
 D₈₅= 0.0053 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= CH AASHTO=

Remarks
 WC=27.7%

Sample No.: CS-6
 Location:

Source of Sample: 7399

Date: 8-8-08
 Elev./Depth:

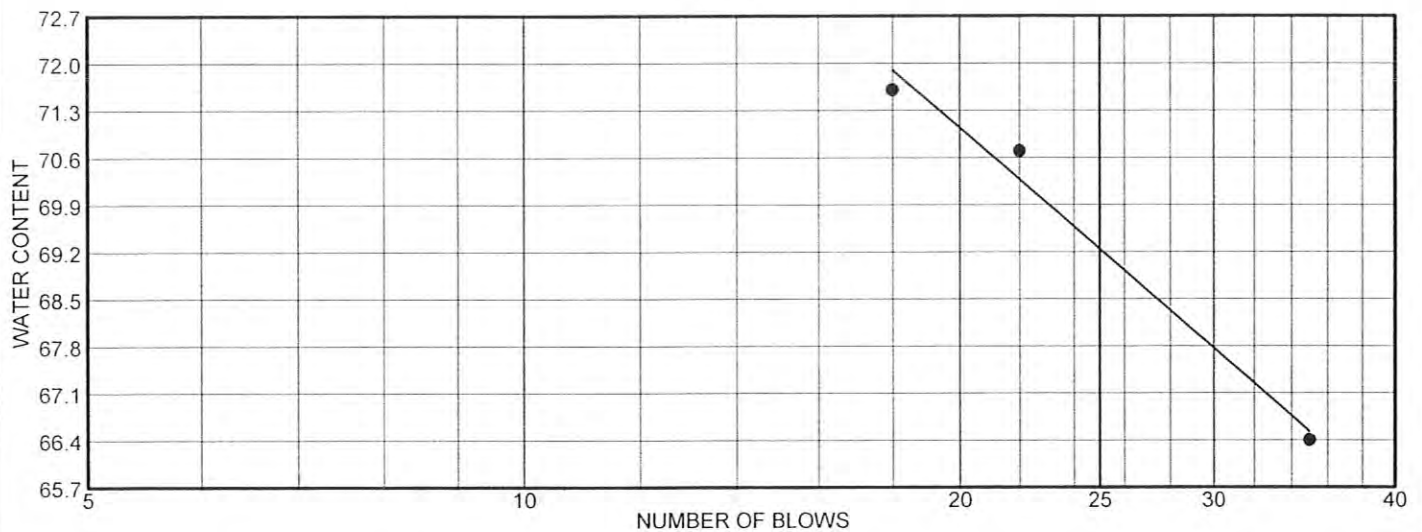
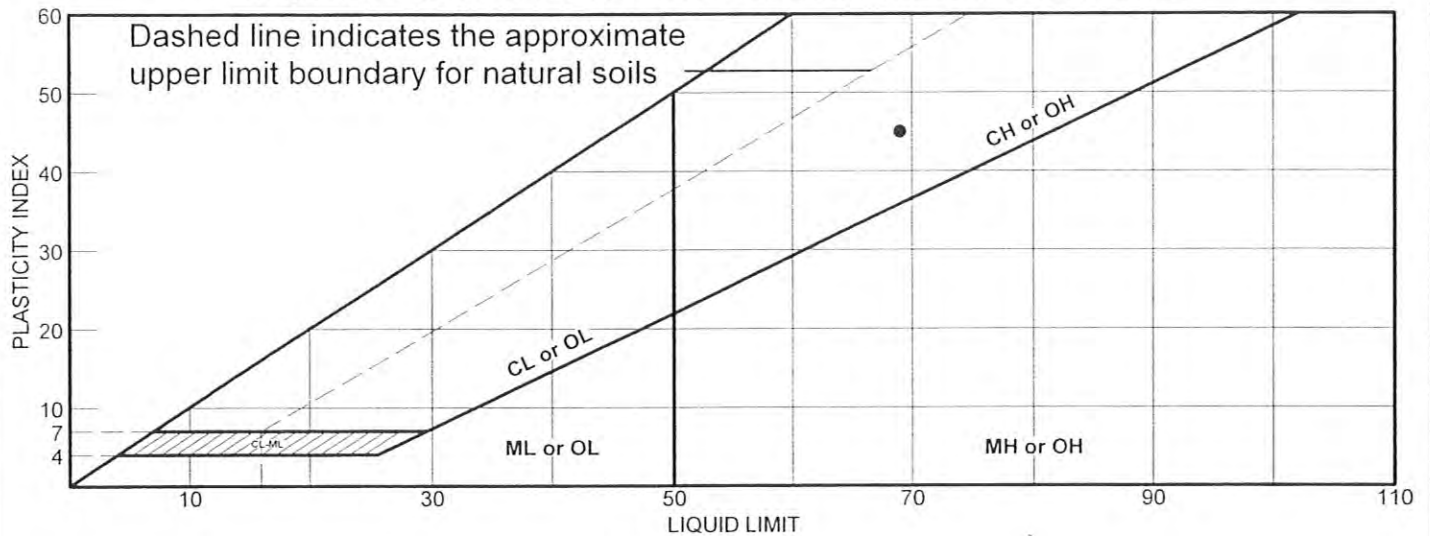
Terracon

Client: TERRACON
 Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 7399

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish brown Fat clay	69	24	45	99.4	99.0	CH

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: 7399

Sample No.: CS-6

Remarks:

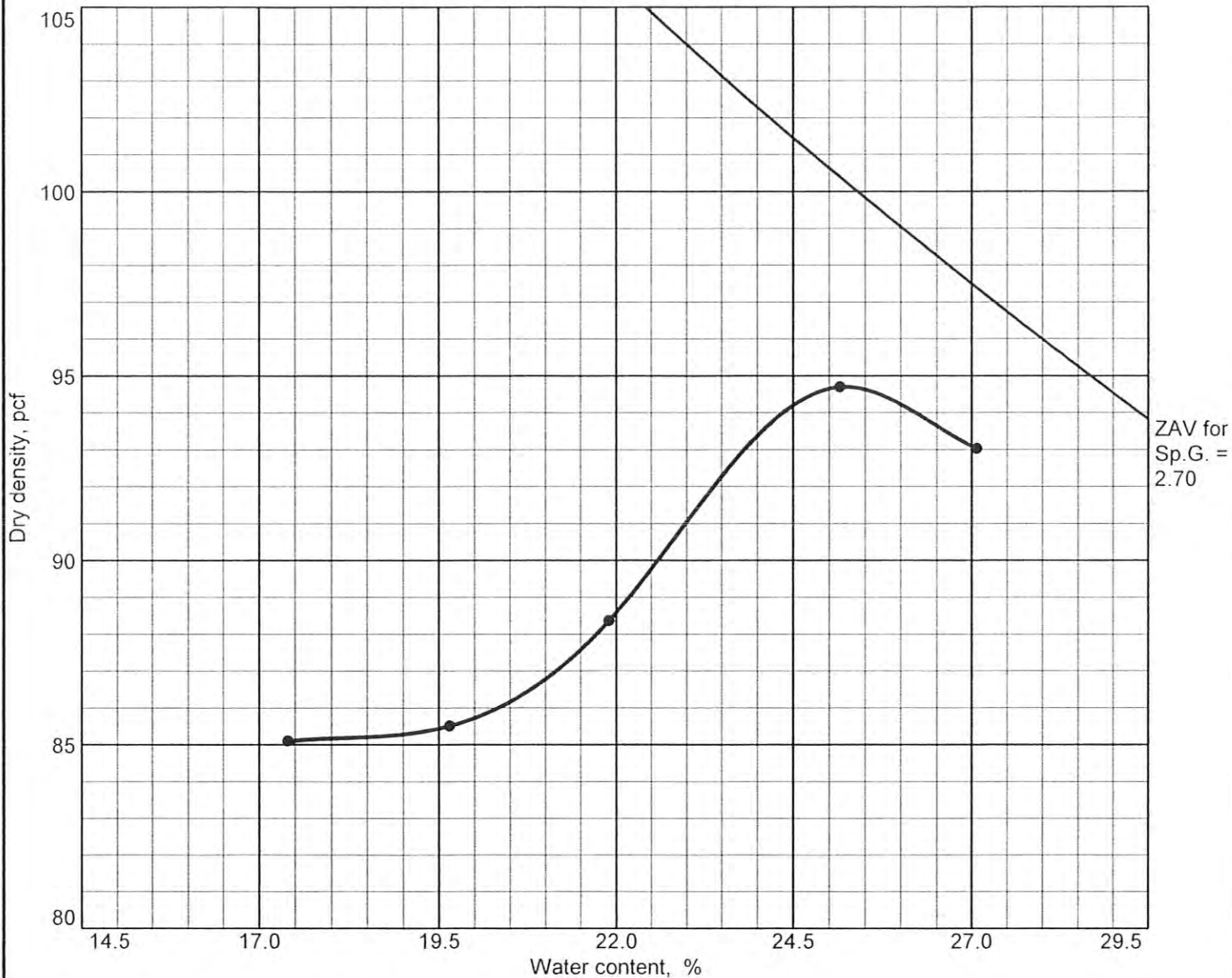
● WC=27.7%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 7399

COMPACTION TEST REPORT



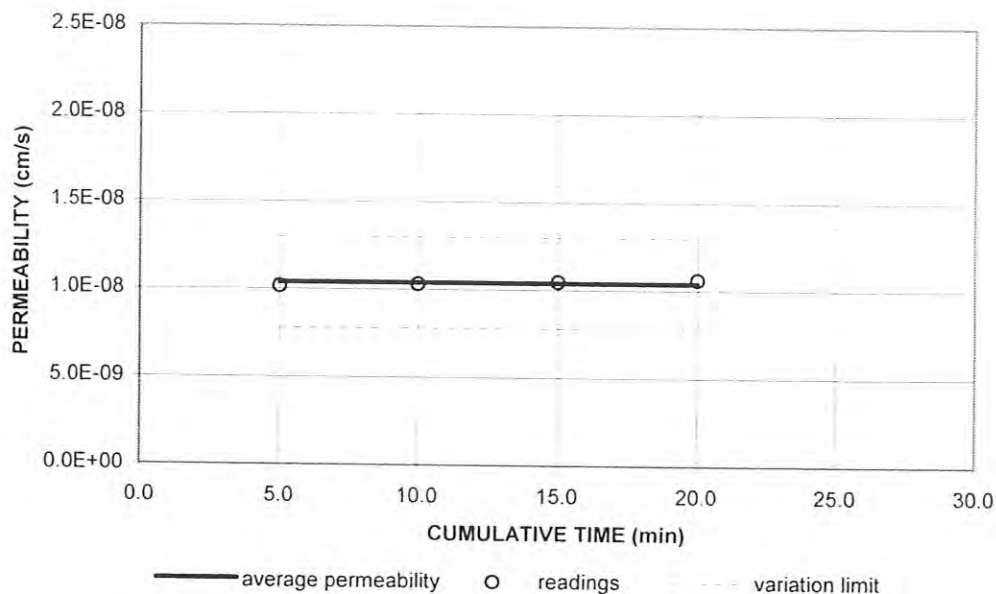
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				69	45	0.0	99.0

TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 94.7 pcf Optimum moisture = 25.2 %		Reddish brown Fat clay
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: 7399 Sample No.: CS-6		Remarks: DATE TYPED 8-7-08 TESTED BY TB
COMPACTION TEST REPORT 		

Figure 7399

FLEXIBLE WALL PERMEABILITY TEST



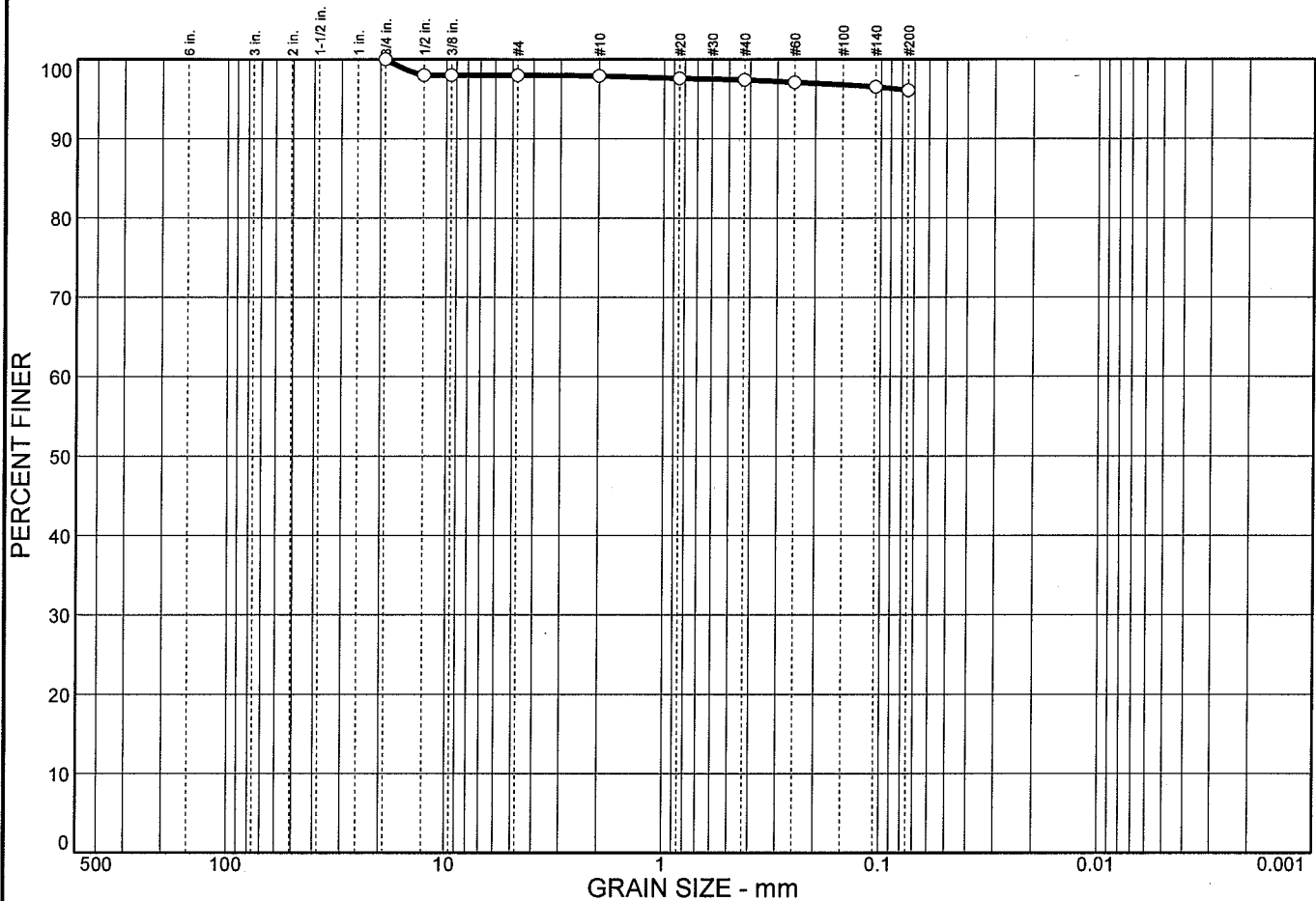
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.34	1.02E-08	1.0E-08
21.00	5.00	10.00	13.15	1.03E-08	
21.00	5.00	15.00	12.97	1.05E-08	
21.00	5.00	20.00	12.78	1.06E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	94.7	Specimen Height, (inches)		3.00	3.00
Opti. M.C., (%)	25.2	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		28.40	32.74
% Recompct.	94.9	Percent Saturation (%)		87.58	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		115.34	119.23
Backpressure	90.00	Dry Mass Density (pcf)		89.82	89.82
Cell pressure	100.00	Void Ratio		0.88	0.88
Eff. Stress	10.00	Calculated Porosity, %		46.69	46.92

USCS		LL	PI	
Permeant Used: WATER		Remarks	Reddish Brown clay	
Project Name	WM TWO PINE		Tested by	FCE Reviewed by TGG
Client	WM	W.O.# 35087053	FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number	CS-6			
Sample Location				
Date	8/18/2008	Lab No. 7399		

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.0	1.9		96.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	98.0		
.375 in.	98.0		
#4	98.0		
#10	97.9		
#20	97.6		
#40	97.4		
#60	97.1		
#140	96.5		
#200	96.1		

* (no specification provided)

Material Description

Dark brown Fat clay

Atterberg Limits

PL= 29

LL= 58

PI= 29

Coefficients

D₈₅=

D₆₀=

D₅₀=

D₃₀=

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= CH

AASHTO=

Remarks

WC=27.8%

Sample No.: CS-7

Source of Sample: CS-7

Date: 8-13-08

Location:

Elev./Depth:

Terracon

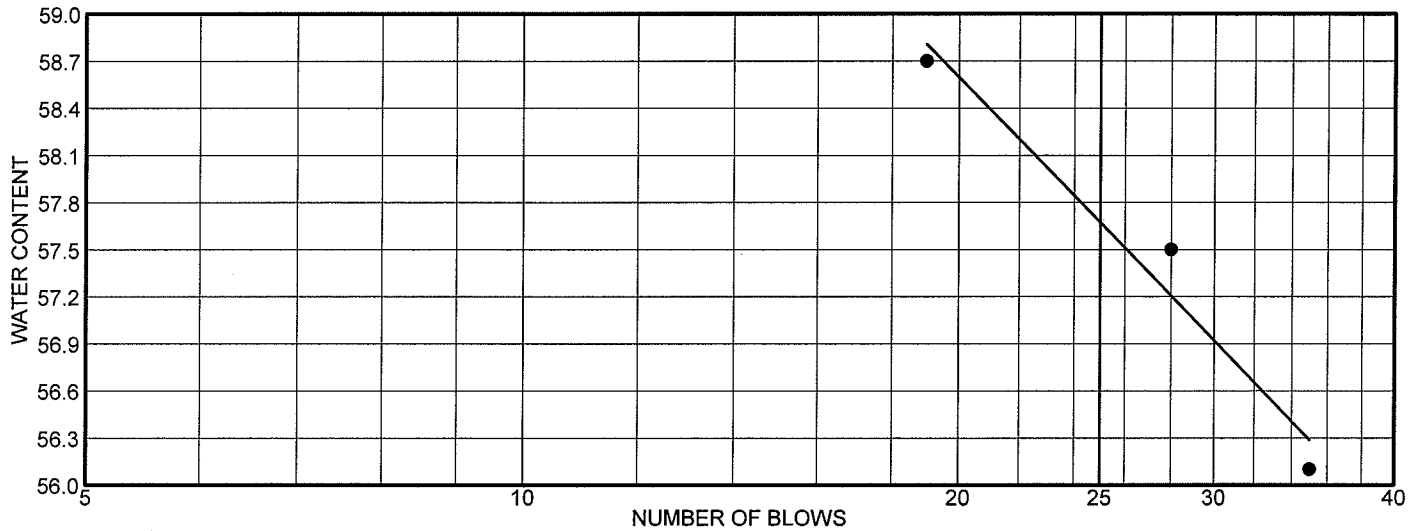
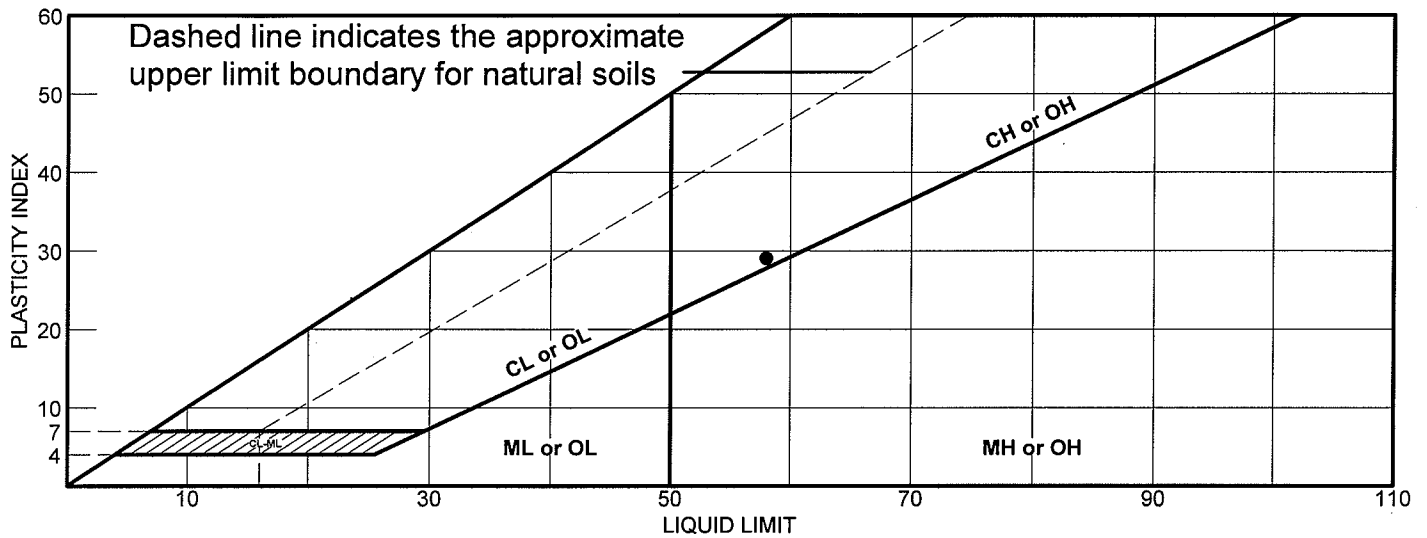
Client: TERRACON

Project: WM TWO PINE - CELL 1

Project No: 35087053

Figure 7447

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown Fat clay	58	29	29	97.4	96.1	CH

Project No. 35087053 Client: TERRACON

Project: WM TWO PINE - CELL 1

● Source: CS-7

Sample No.: CS-7

Remarks:

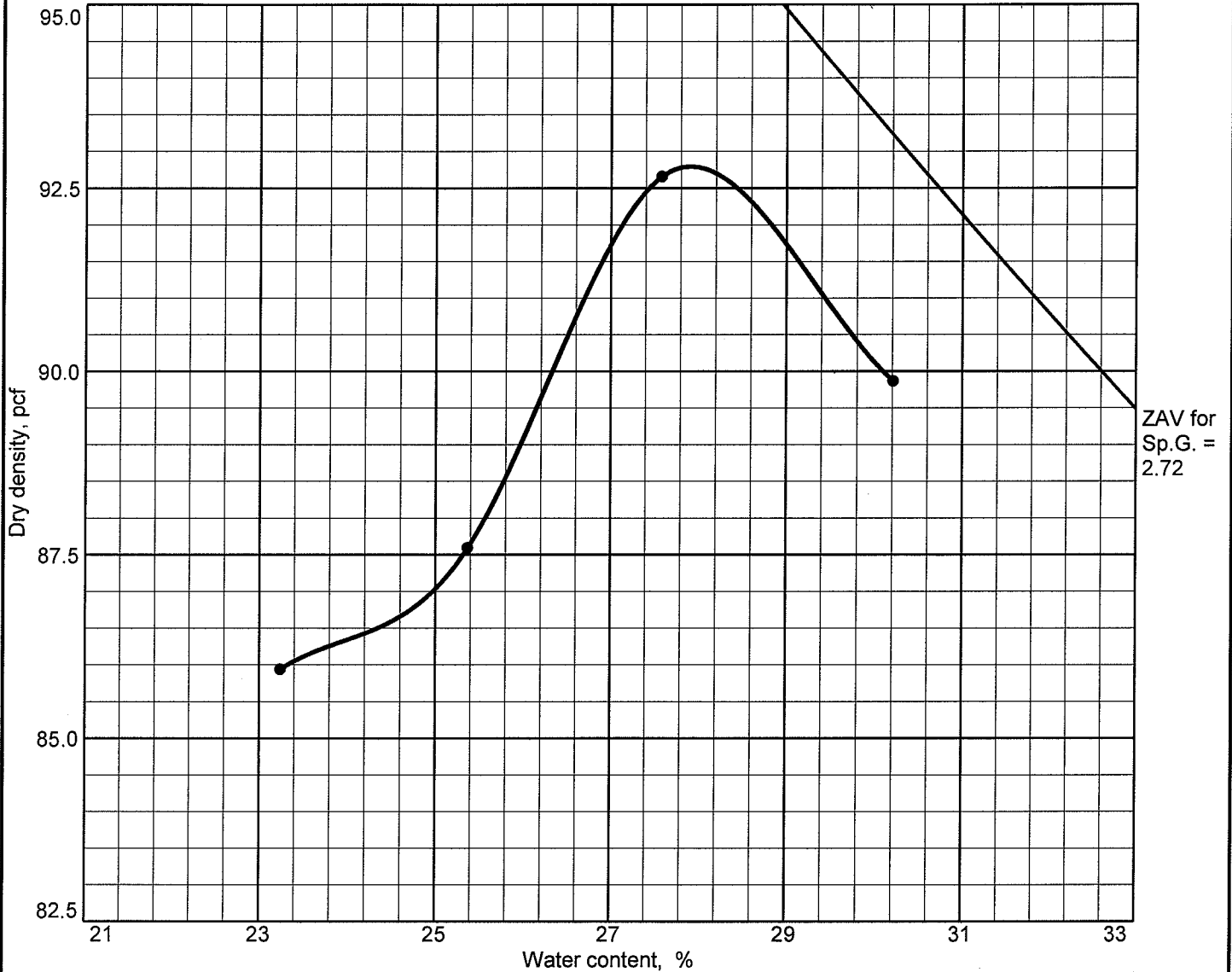
● WC=27.8%

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 7447

COMPACTION TEST REPORT

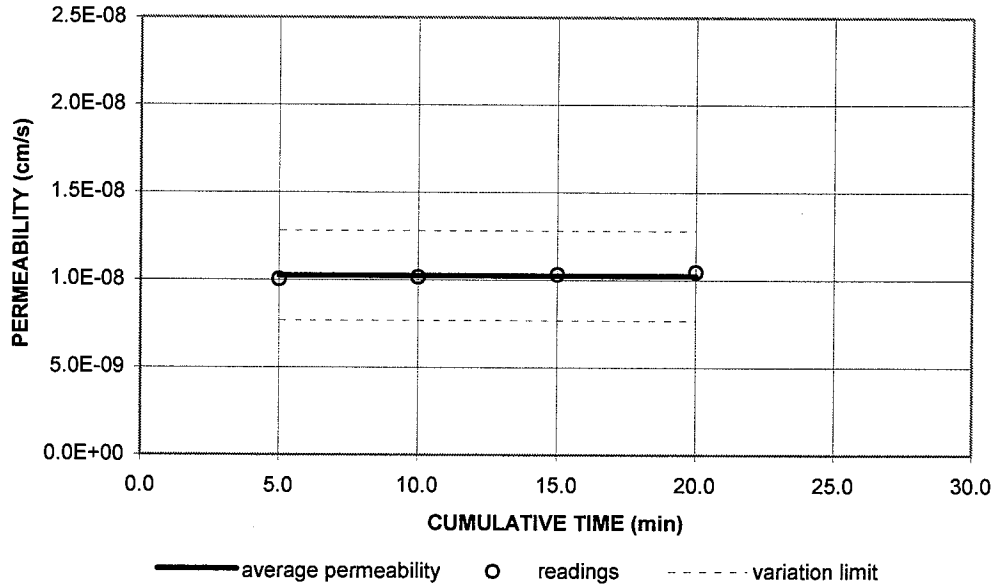


Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH		27.8		58	29	2.0	96.1

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 92.8 pcf		Dark brown Fat clay	
Optimum moisture = 27.9 %			
Project No. 35087053 Client: TERRACON Project: WM TWO PINE - CELL 1 ● Source: CS-7			

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

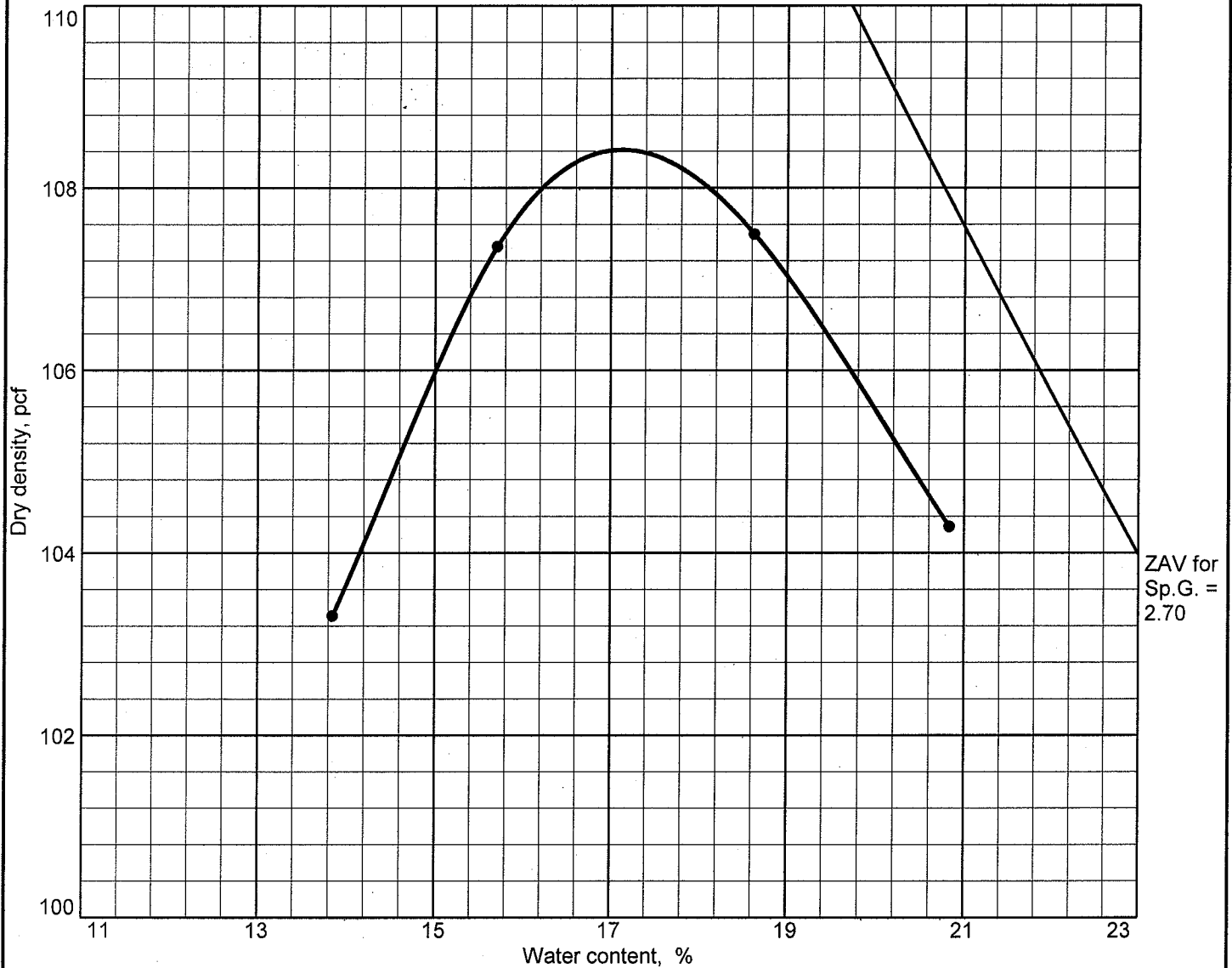
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.52	1.00E-08	1.0E-08
21.00	5.00	10.00	13.34	1.02E-08	
21.00	5.00	15.00	13.15	1.03E-08	
21.00	5.00	20.00	12.97	1.05E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	92.8	Specimen Height, (inches)		3.00	3.00
Opti. M.C., (%)	27.9	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		30.88	33.44
% Recompct.	95.0	Percent Saturation (%)		91.54	99.13
Test Pressures (psi)		Wet Mass Density (pcf)		115.40	117.66
Backpressure	90.00	Dry Mass Density (pcf)		88.17	88.17
Cell pressure	100.00	Void Ratio		0.91	0.91
Eff. Stress	10.00	Calculated Porosity, %		47.67	47.67

USCS		LL		PI	
Permeant Used: WATER		Remarks		Dark brown fat clay	
Project Name WM TWO PINE			Tested by FCE Reviewed by TGG		
Client WM W.O.# 35087053			FLEXIBLE WALL PERMEABILITY TEST 		
Sample Number CS-7					
Sample Location					
Date 8/15/2008		Lab No. 7447			

APPENDIX D
CONSTRUCTION TESTING – ENGINEERED
BUFFER & CLAY LINER

COMPACTION TEST REPORT



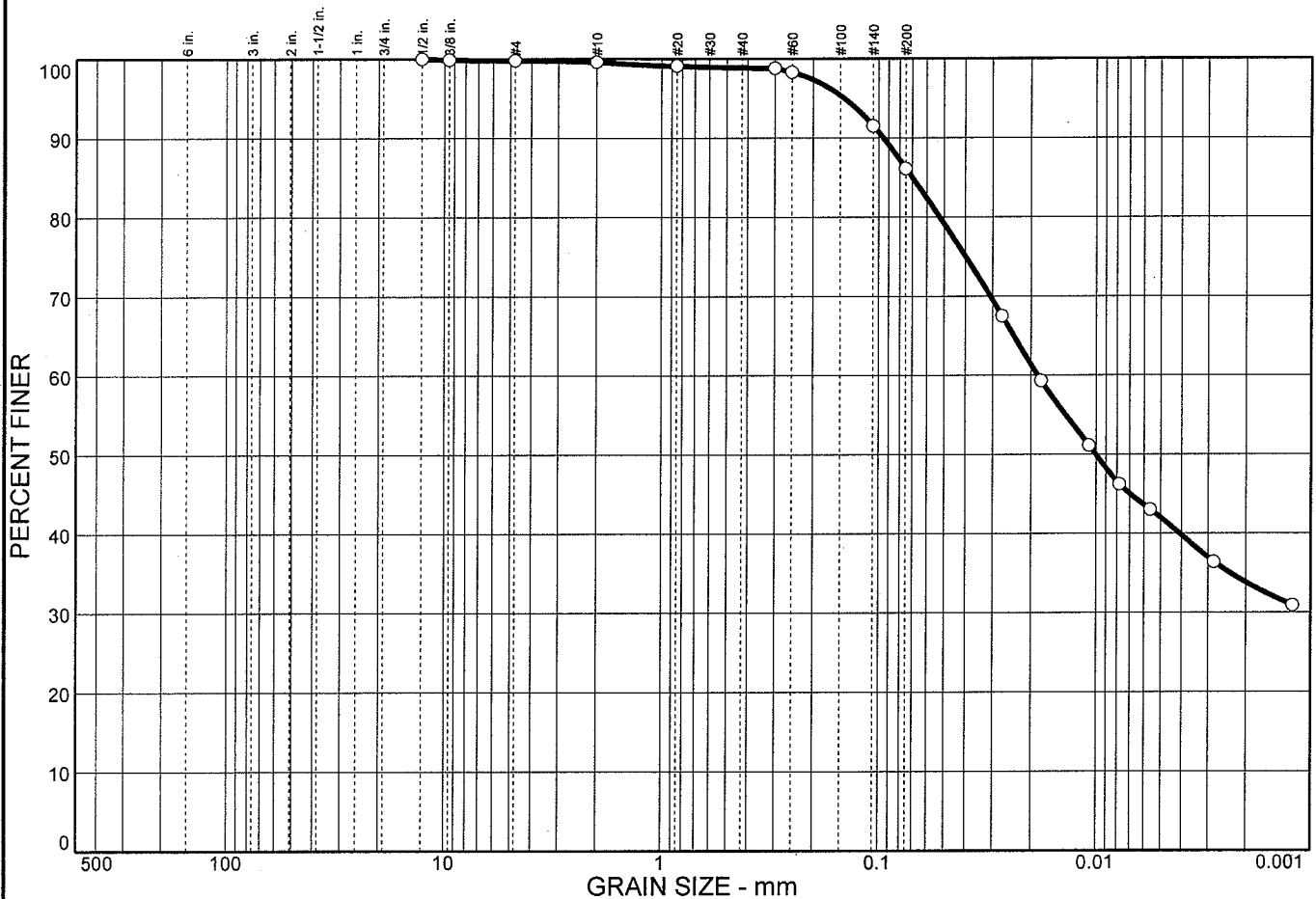
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
BULK								

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 108.4 pcf		BROWN LEAN CLAY	
Optimum moisture = 17.1 %			
Project No. 35087052 Client: WASTE MANAGEMENT INC Project: WM TWO PINE CLOSURE PLAN NORTH LITTLE ROCK, AR ● Source: 4707 Sample No.: PR-1 Elev./Depth: BULK		Remarks: DATE TYPED 6-19-09 TESTED BY TGG	
COMPACTION TEST REPORT 			
		Figure 4707	

Figure 4707

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	13.7	44.1	42.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.9		
#4	99.8		
#10	99.6		
#20	99.1		
#50	98.8		
#60	98.3		
#140	91.5		
#200	86.1		

* (no specification provided)

Material Description		
BROWN LEAN CLAY		
Atterberg Limits PL= 15 LL= 32 PI= 17		
Coefficients D₈₅= 0.0703 D₆₀= 0.0186 D₅₀= 0.0101 D₃₀= D₁₅= D₁₀= C_u= C_c=		
Classification USCS= CL AASHTO=		
Remarks		

Sample No.: PR-1
Location:

Source of Sample: 4707

Date: 6-19-09
Elev./Depth: BULK

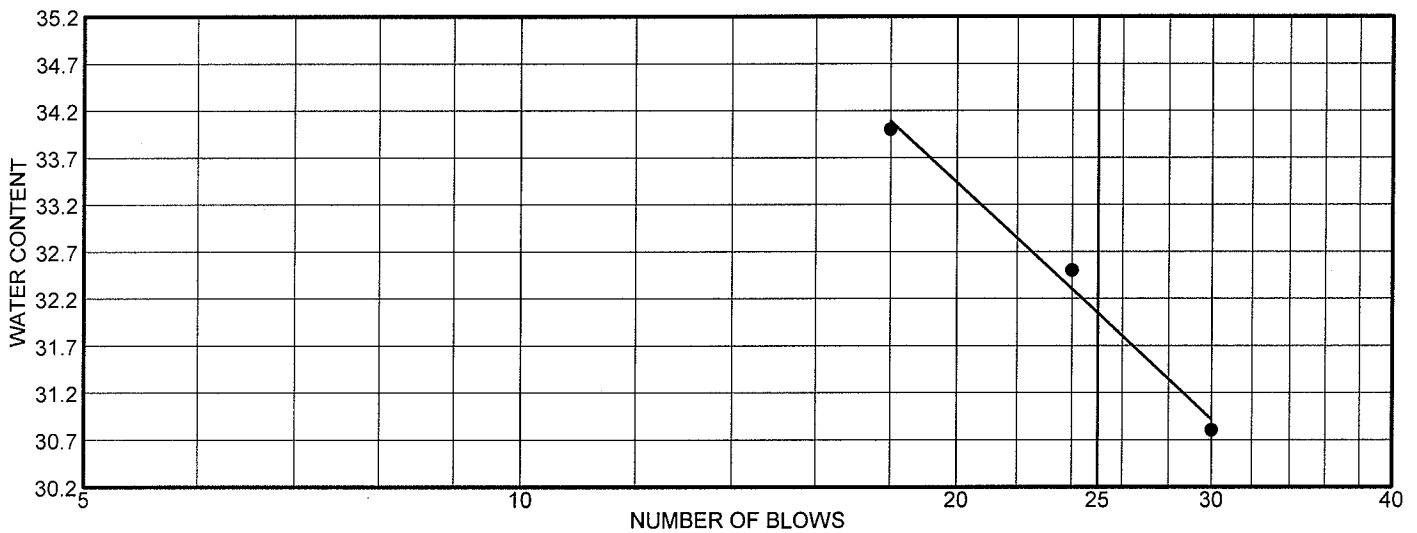
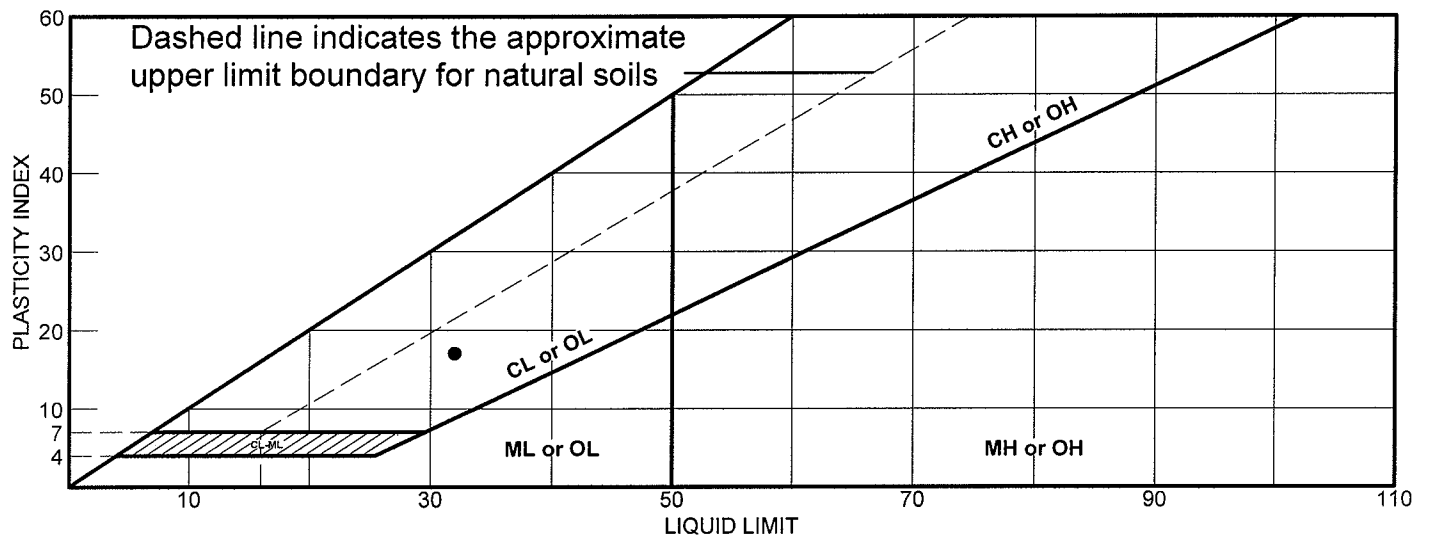
Terracon

Client: WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN
NORTH LITTLE ROCK, AR

Project No: 35087052

Figure 4707

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	BROWN LEAN CLAY	32	15	17	98.9	86.1	CL

Project No. 35087052 **Client:** WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN
 NORTH LITTLE ROCK, AR
● Source: 4707 **Sample No.:** PR-1 **Elev./Depth:** BULK

Remarks:

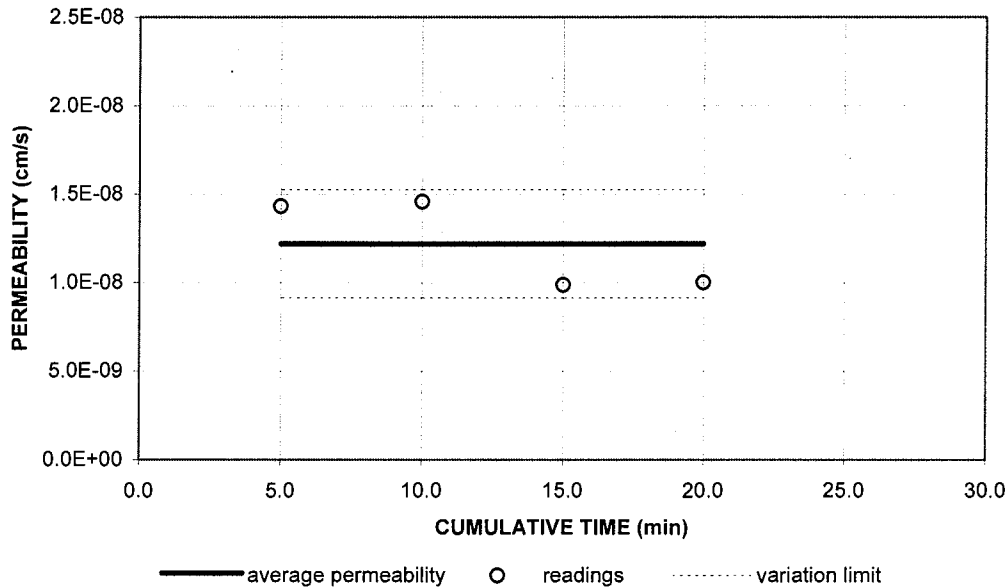
●

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 4707

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: **ASTM D 5084**

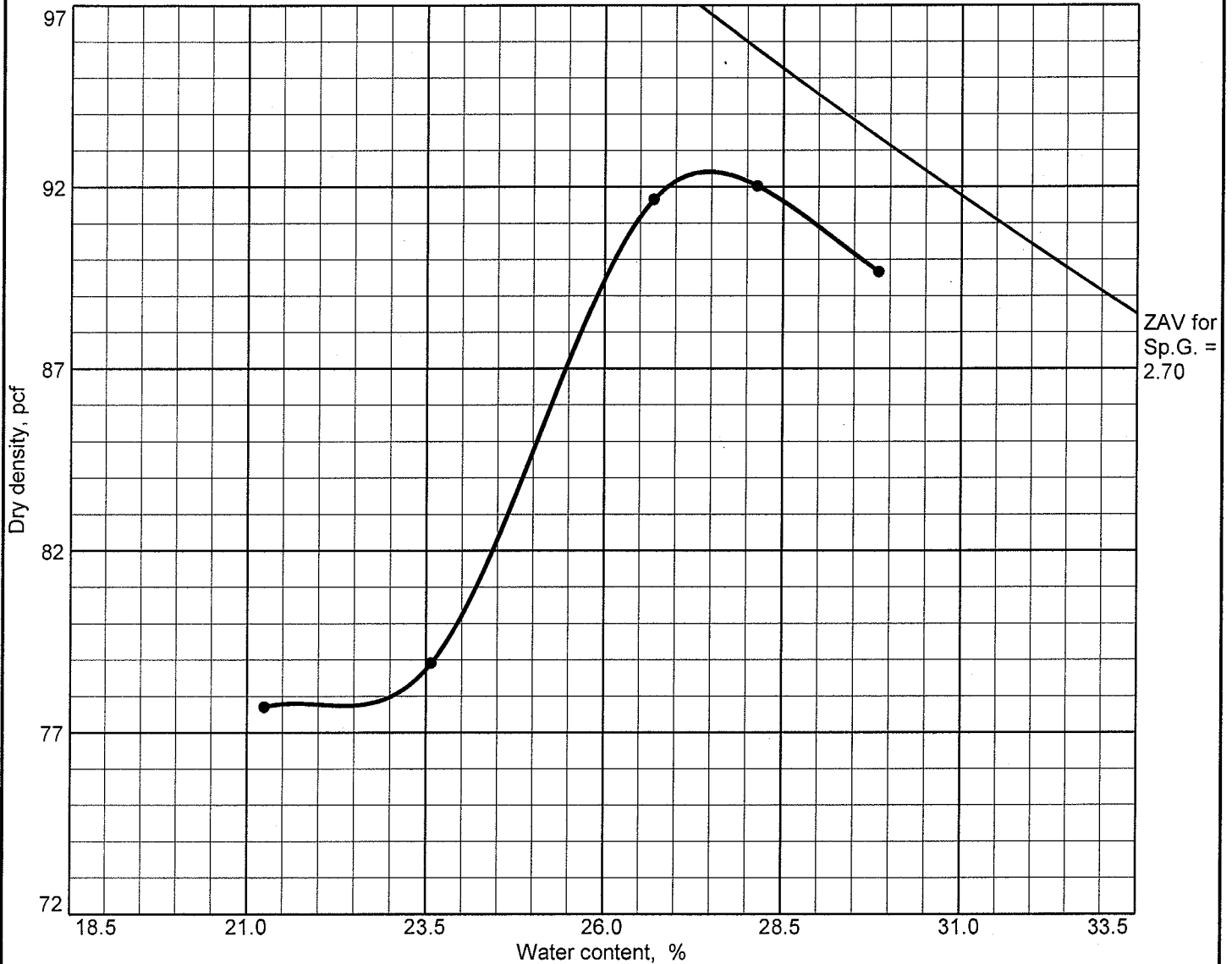
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.17	1.43E-08	1.2E-08
21.00	5.00	10.00	13.89	1.46E-08	
21.00	5.00	15.00	13.71	9.90E-09	
21.00	5.00	20.00	13.52	1.00E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	108.4	Specimen Height, (inches)		3.00	2.98
Opti. M.C., (%)	20.0	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		19.96	21.99
% Recompct.	95.1	Percent Saturation (%)		84.98	95.26
Test Pressures (psi)		Wet Mass Density (pcf)		123.68	126.61
Backpressure	90.00	Dry Mass Density (pcf)		103.10	103.79
Cell pressure	100.00	Void Ratio		0.63	0.62
Eff. Stress	10.00	Calculated Porosity, %		38.81	38.40

USCS		LL	PI	
Permeant Used:		WATER	Remarks	BROWN LEAN CLAY
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-4707			
Sample Location	PR-1			
Date	6/25/2009	Lab No.	4707	

6/25/2009

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				80	54	0.0	97.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 92.4 pcf Optimum moisture = 27.5 %	Dark brown Fat clay
Project No. 35097116 Client: WASTE MANAGEMENT Project: WM TWO PINE - CELL 3 CQA NORTH LITTLE ROCK, AR ● Source: 4857	

Figure 4857

PERCENT FINER

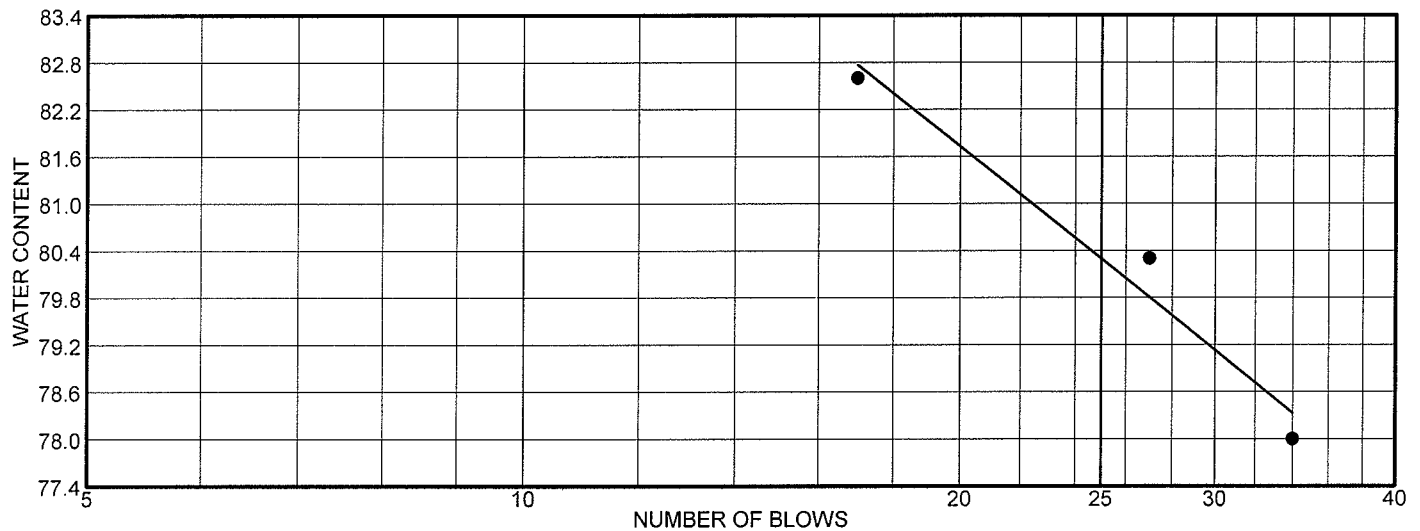
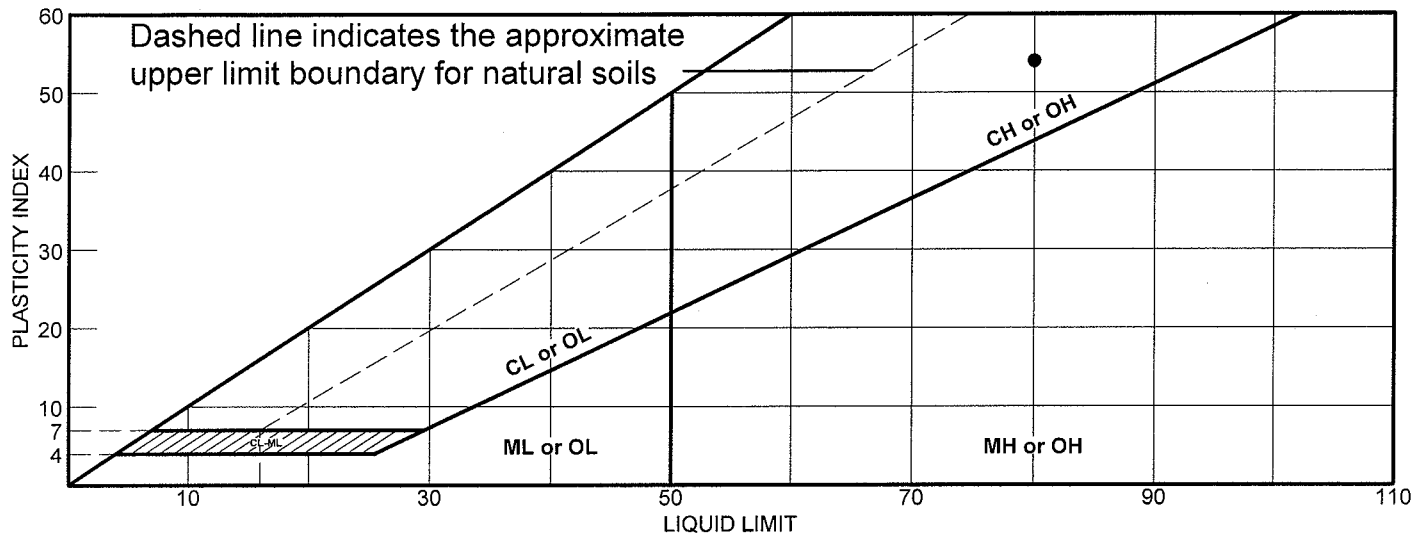


SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.8		
#10	99.6		
#20	99.4		
#40	98.8		
#60	98.4		
#140	97.8		
#200	97.6		

Remarks

Figure 4857

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	Dark brown Fat clay	80	26	54	98.8	97.6	CH

Project No. 35097116 Client: WASTE MANAGEMENT

Project: WM TWO PINE - CELL 3 CQA
NORTH LITTLE ROCK, AR

• Source: 4857

Sample No.: PR-2

Remarks:

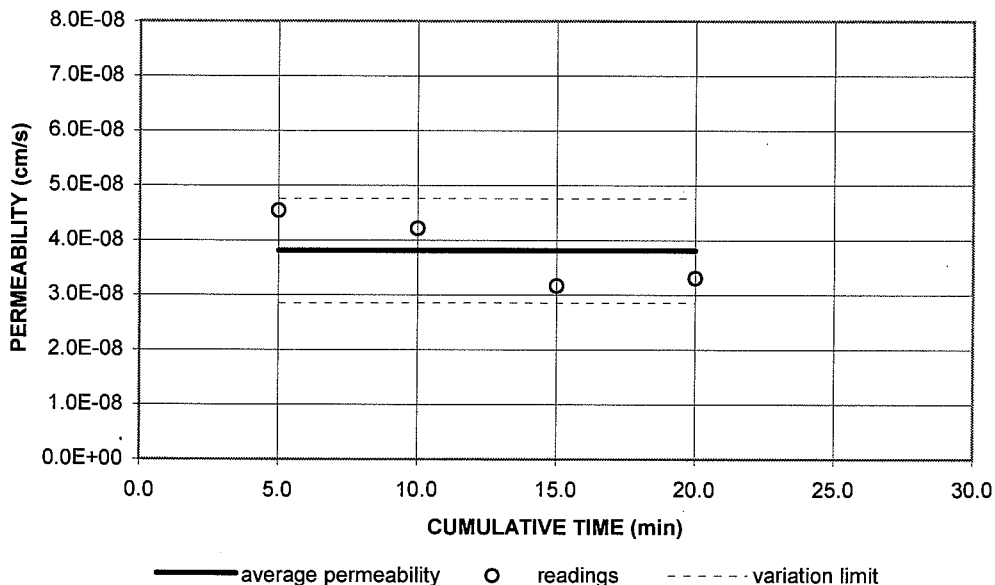
•

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 4857

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

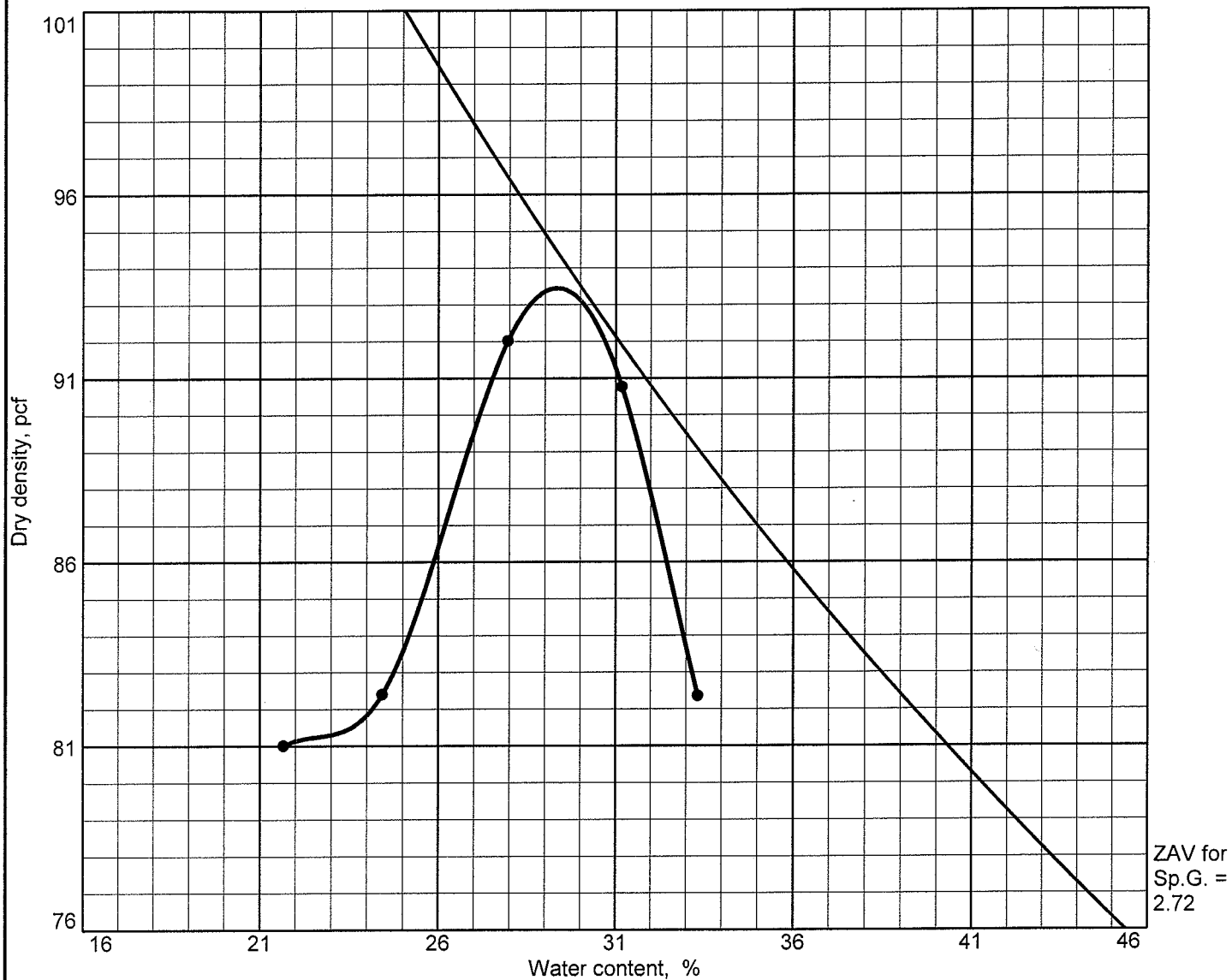
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	11.67	4.54E-08	3.8E-08
21.00	5.00	10.00	11.02	4.22E-08	
21.00	5.00	15.00	10.56	3.17E-08	
21.00	5.00	20.00	10.10	3.31E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	92.4	Specimen Height, (inches)		3.00	3.00
Opti. M.C., (%)	27.5	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		30.14	32.67
% Recompct.	95.3	Percent Saturation (%)		89.02	96.49
Test Pressures (psi)		Wet Mass Density (pcf)		114.55	116.77
Backpressure	90.00	Dry Mass Density (pcf)		88.02	88.02
Cell pressure	100.00	Void Ratio		0.91	0.91
Eff. Stress	10.00	Calculated Porosity, %		47.76	47.76

USCS		LL	PI			
Permeant Used:	WATER	Remarks	DARK BROWN FAT CLAY			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-4857					
Sample Location	PR-2					
Date	7/9/2009	Lab No.	4857			

7/9/2009

COMPACTION TEST REPORT



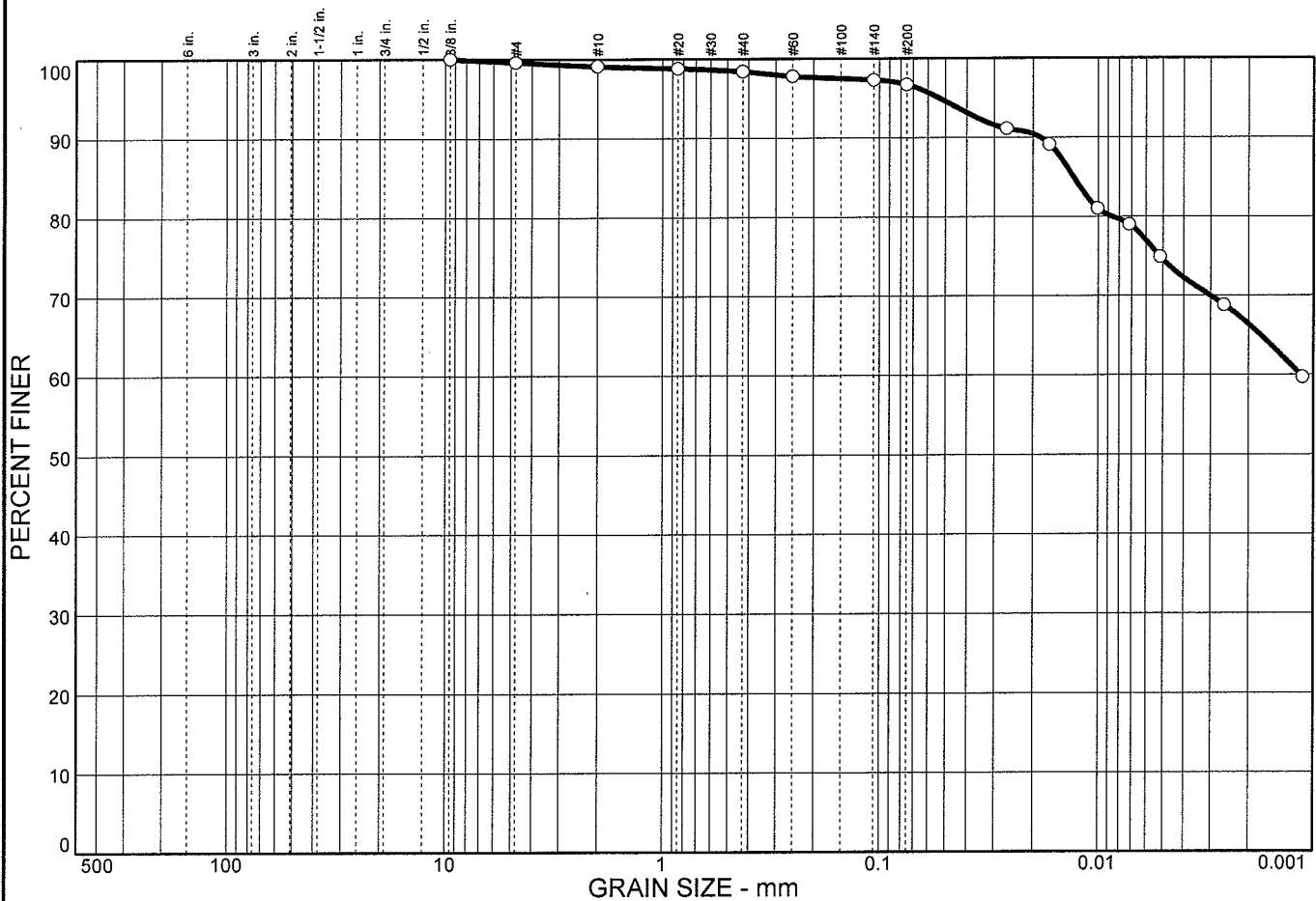
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				70	43	0.0	96.7

TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 93.5 pcf Optimum moisture = 29.3 %		Dark brown and gray Fat clay
Project No. 35097116 Client: WASTE MANAGEMENT Project: WM TWO PINE - CELL 3 CQA NORTH LITTLE ROCK, AR ● Source: 5060 Sample No.: PR-3		Remarks:
COMPACTION TEST REPORT 		

Figure 5060

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.4	2.9	22.2	74.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.6		
#10	99.1		
#20	98.8		
#40	98.4		
#60	97.8		
#140	97.3		
#200	96.7		

* (no specification provided)

Material Description
 Dark brown and gray Fat clay

Atterberg Limits
 PL= 27 LL= 70 PI= 43

Coefficients
 D₈₅= 0.0130 D₆₀= 0.0011 D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= CH AASHTO=

Remarks

Sample No.: PR-3
Location:

Source of Sample: 5060

Date: 7-16-09
Elev./Depth:

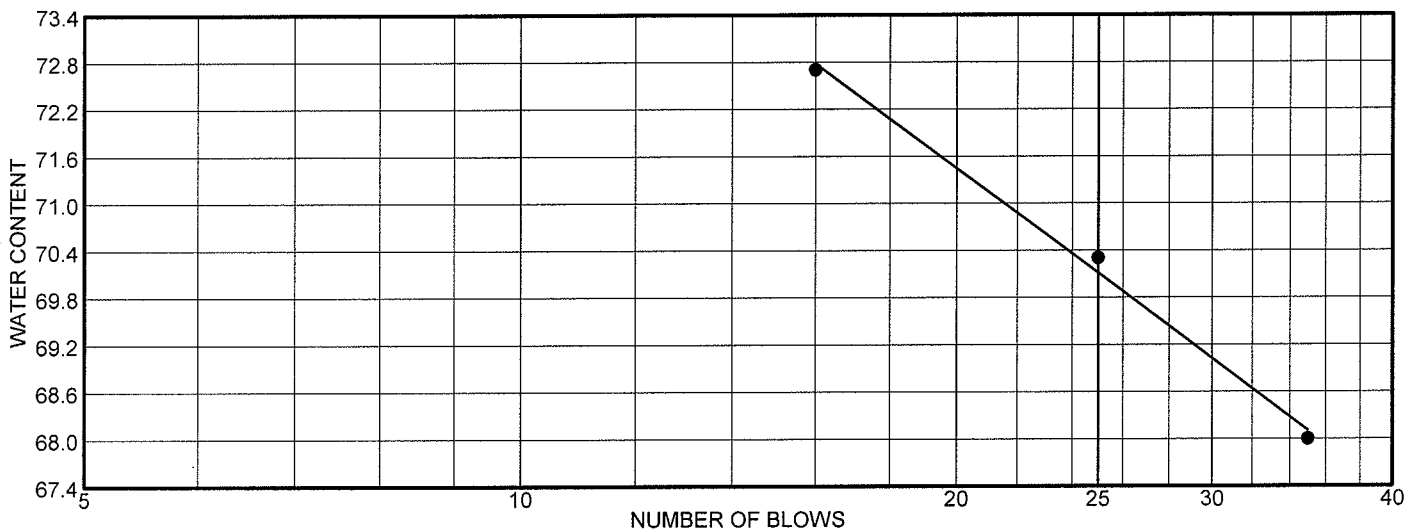
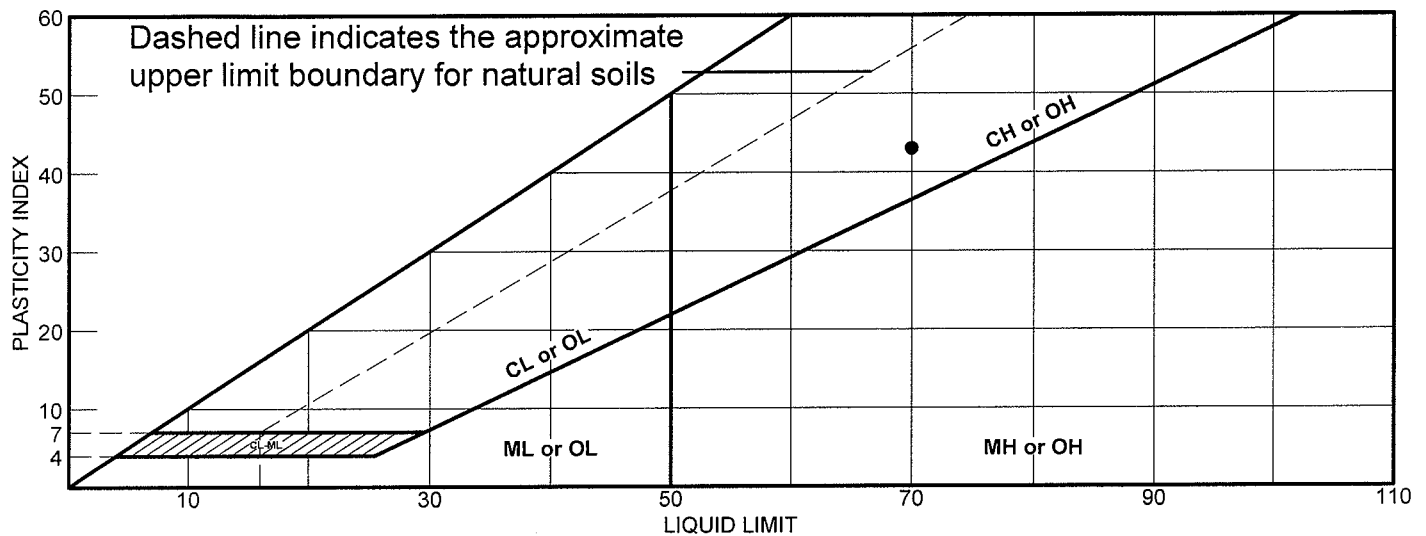
Terracon

Client: WASTE MANAGEMENT
Project: WM TWO PINE - CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 5060

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown and gray Fat clay	70	27	43	98.4	96.7	CH

Project No. 35097116 Client: WASTE MANAGEMENT

Project: WM TWO PINE - CELL 3 CQA
NORTH LITTLE ROCK, AR

● Source: 5060

Sample No.: PR-3

Remarks:

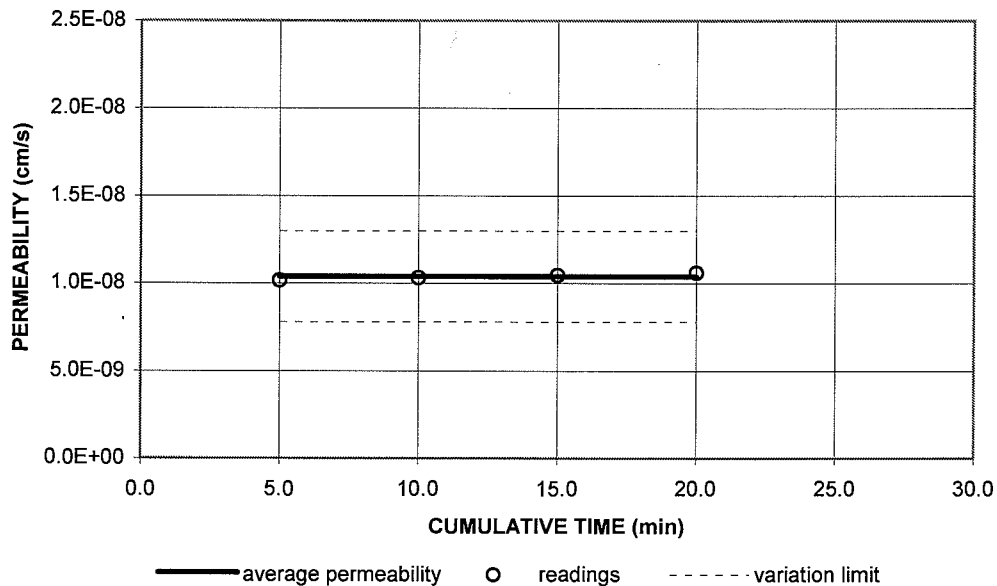
●

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 5060

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.34	1.02E-08	1.0E-08
21.00	5.00	10.00	13.15	1.03E-08	
21.00	5.00	15.00	12.97	1.05E-08	
21.00	5.00	20.00	12.78	1.06E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	93.0	Specimen Height, (inches)		3.00	3.03
Opti. M.C., (%)	29.8	Specimen Diameter, (inches)		4.00	4.00
Comp. Method	D698-91 Standard,	Moisture Content, (%)		32.56	33.41
% Recompt.	95.2	Percent Saturation (%)		97.29	97.79
Test Pressures (psi)		Wet Mass Density (pcf)		117.33	116.92
Backpressure	90.00	Dry Mass Density (pcf)		88.51	87.64
Cell pressure	100.00	Void Ratio		0.90	0.92
Eff. Stress	10.00	Calculated Porosity, %		47.46	47.98

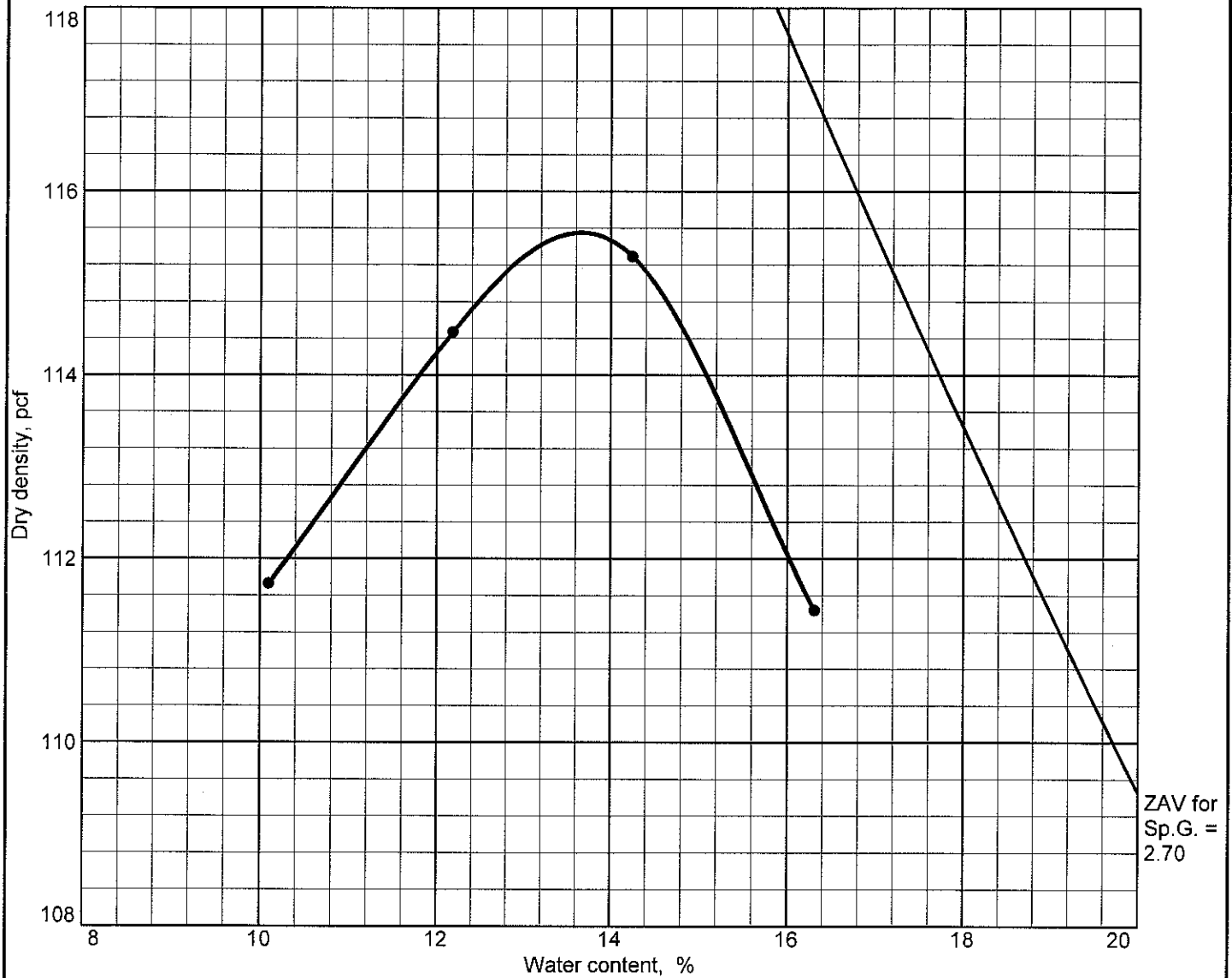
USCS		LL	PI
Permeant Used:	WATER	Remarks	DARK BROWN AN GRAY FAT CLAY

Project Name	WM TWO PINE -CELL 3 CQA			Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number	S-5060						
Sample Location	PR-3						
Date	7/16/2009	Lab No.	5060				

FLEXIBLE WALL PERMEABILITY TEST

Terracon

COMPACTION TEST REPORT



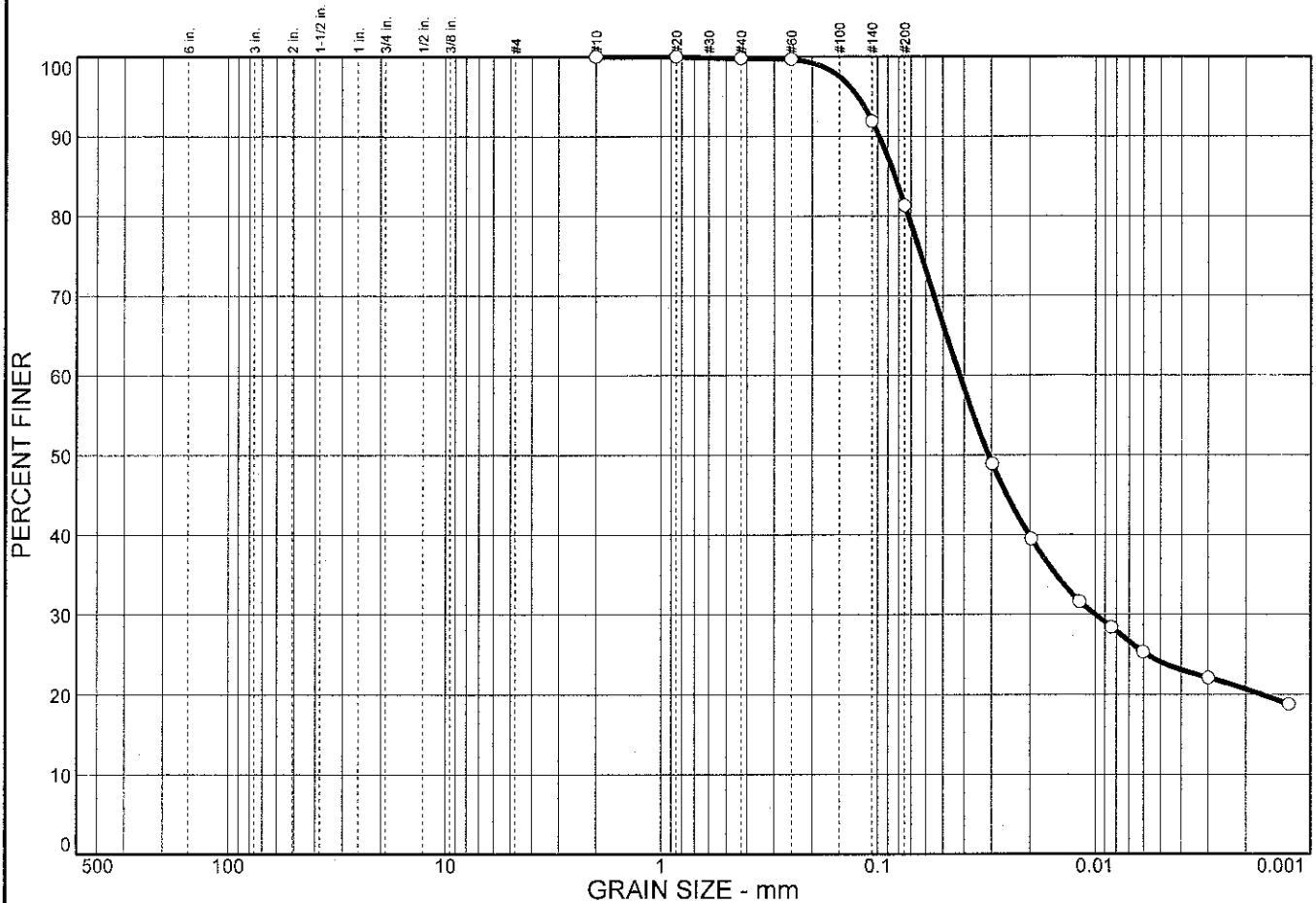
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
Bulk	CL				25	8	0.0	81.3

TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 115.6 pcf		Brown Lean clay with sand
Optimum moisture = 13.7 %		
Project No. 35097116 Client: WASTE MANAGEMENT INC Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA NORTH LITTLE ROCK, AR ● Source: 5287 Sample No.: PR-4 Elev./Depth: Bulk		Remarks: Field Tech: J. Smith Lab Tested: E.J.
COMPACTION TEST REPORT 		
		Figure 5287

Figure 5287

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	18.7	57.2	24.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.8		
#60	99.7		
#140	91.3		
#200	81.3		

* (no specification provided)

Material Description

Brown Lean clay with sand

Atterberg Limits

PL= 17

LL= 25

PI= 8

Coefficients

D₈₅= 0.0835

D₆₀= 0.0420

D₅₀= 0.0309

D₃₀= 0.0100

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= CL

AASHTO=

Remarks

Sample No.: PR-4

Location:

Source of Sample: 5287

Date: 7-21-09

Elev./Depth: Bulk

Terracon

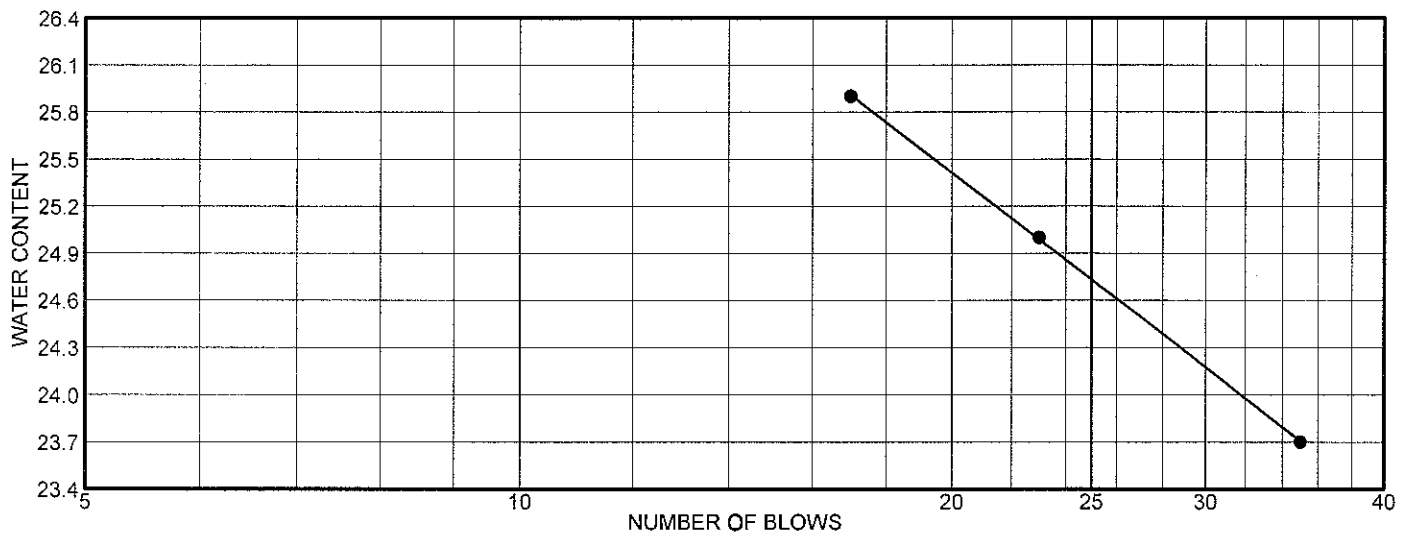
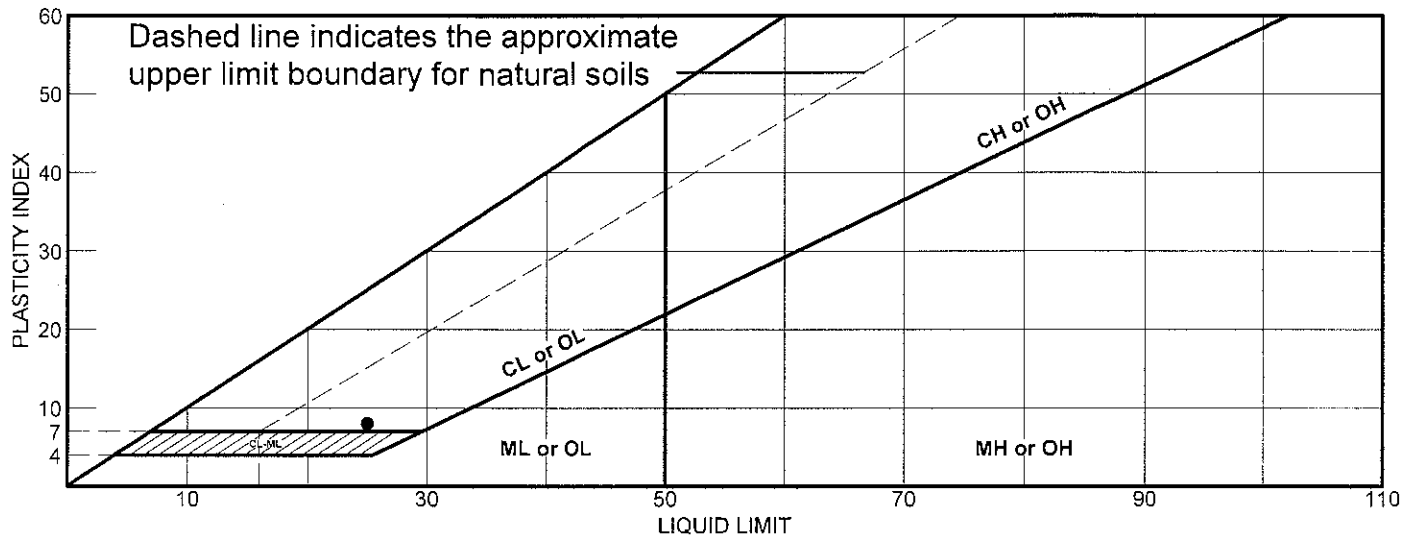
Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 5287

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Lean clay with sand	25	17	8	99.8	81.3	CL

Project No. 35097116 **Client:** WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

● **Source:** 5287

Sample No.: PR-4

Elev./Depth: Bulk

Remarks:

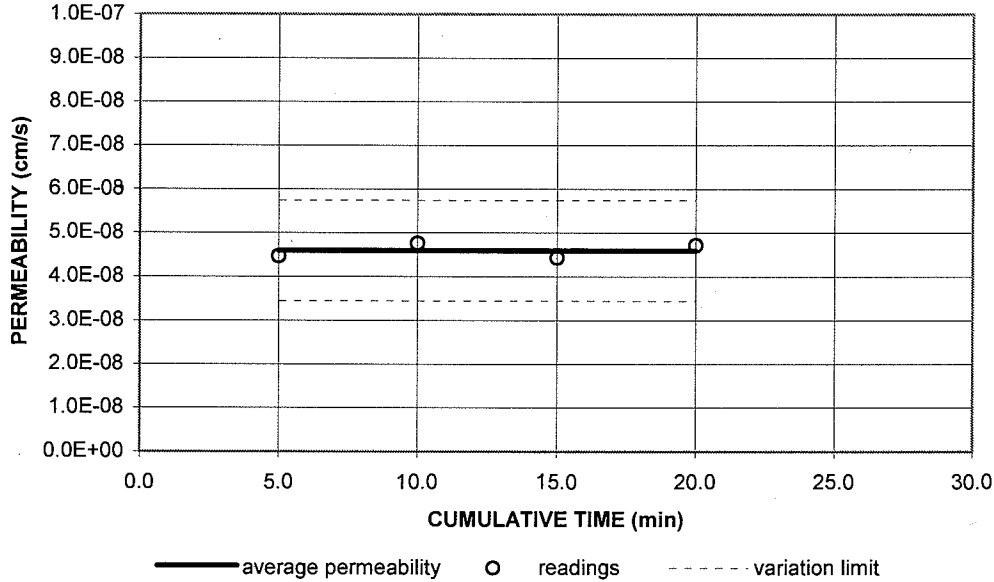
●

LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 5287

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	11.86	4.47E-08	4.6E-08
21.00	5.00	10.00	11.11	4.76E-08	
21.00	5.00	15.00	10.47	4.43E-08	
21.00	5.00	20.00	9.82	4.72E-08	

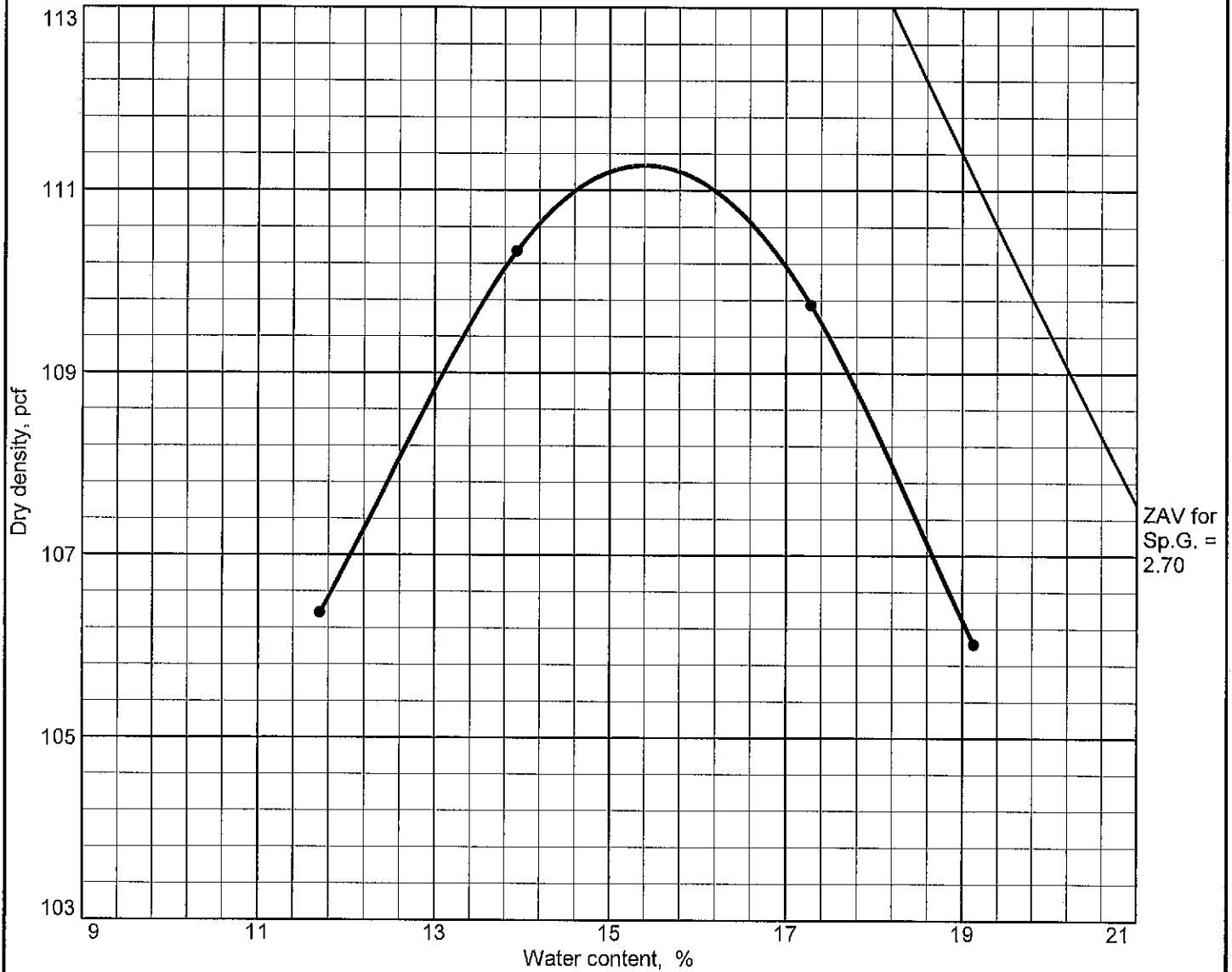
Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	115.6	Specimen Height, (inches)		3.00	2.99
Opti. M.C., (%)	13.7	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		16.90	19.15
% Recompt.	94.8	Percent Saturation (%)		84.99	97.24
Test Pressures (psi)		Wet Mass Density (pcf)		128.16	131.06
Backpressure	90.00	Dry Mass Density (pcf)		109.63	110.00
Cell pressure	100.00	Void Ratio		0.54	0.53
Eff. Stress	10.00	Calculated Porosity, %		34.93	34.71

USCS	LL	PI
Permeant Used: WATER	Remarks BROWN LEAN CLAY WITH SAND	

Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number	S-5287						
Sample Location	PR-4	BULK					
Date	7/27/2009	Lab No.	5287				

7/27/2009

COMPACTION TEST REPORT



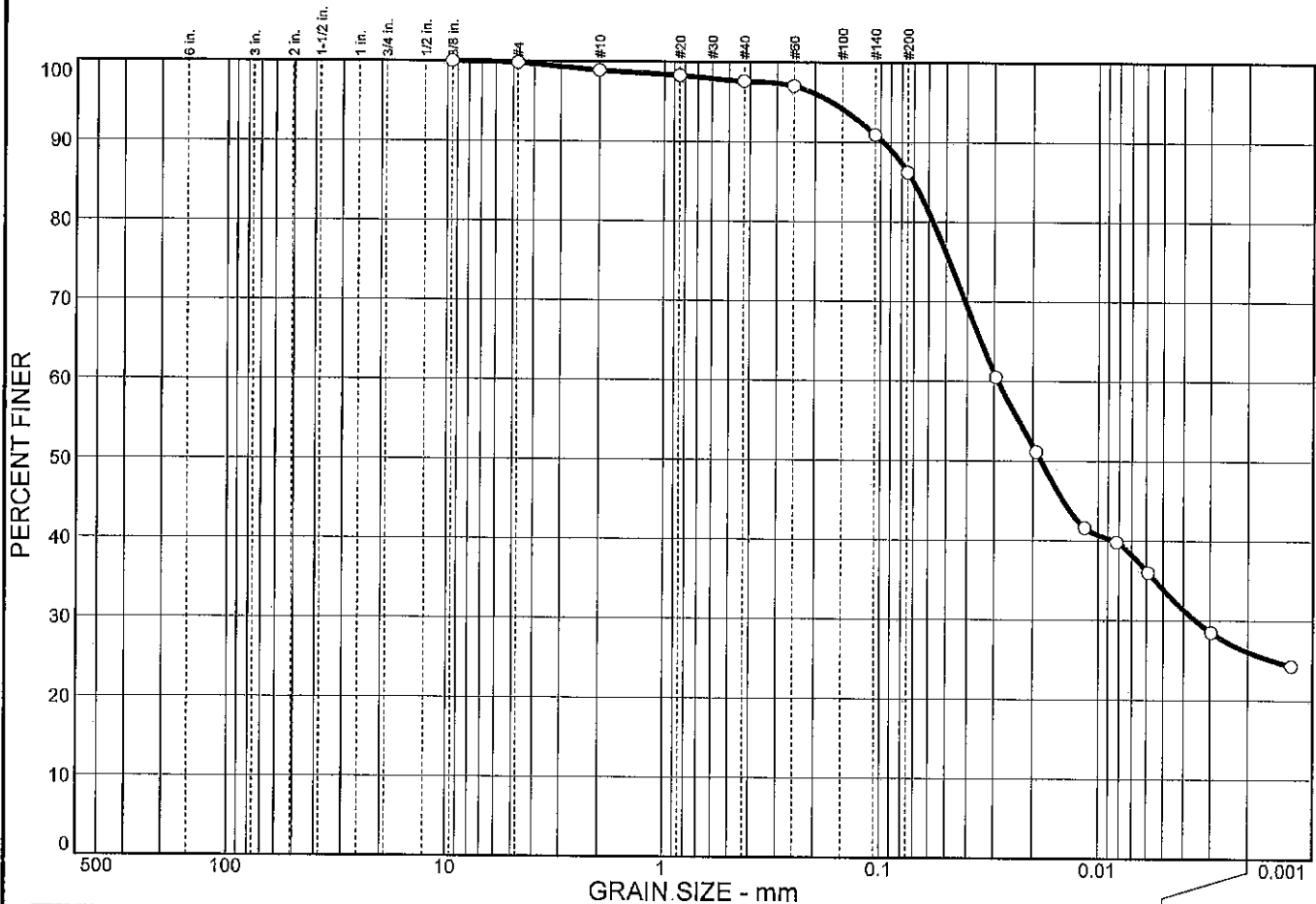
Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CL				30	15	0.0	86.2

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 111.3 pcf Optimum moisture = 15.4 %		Brown Lean clay	
Project No. 35097116 Client: WASTE MANAGEMENT INC Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA NORTH LITTLE ROCK, AR ● Source: 5866			

Figure 5866

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	13.6	60.1	26.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.8		
#10	98.9		
#20	98.3		
#40	97.6		
#60	97.0		
#140	90.9		
#200	86.2		

* (no specification provided)

Material Description		
Brown Lean clay		
Atterberg Limits		
PL= 15	LL= 30	PI= 15
Coefficients		
D ₈₅ = 0.0706	D ₆₀ = 0.0288	D ₅₀ = 0.0183
D ₃₀ = 0.0035	D ₁₅ =	D ₁₀ =
C _u =	C _c =	
Classification		
USCS= CL	AASHTO=	
Remarks		

Sample No.: PR-5
Location:

Source of Sample: 5866

Date: 8-21-09
Elev./Depth:

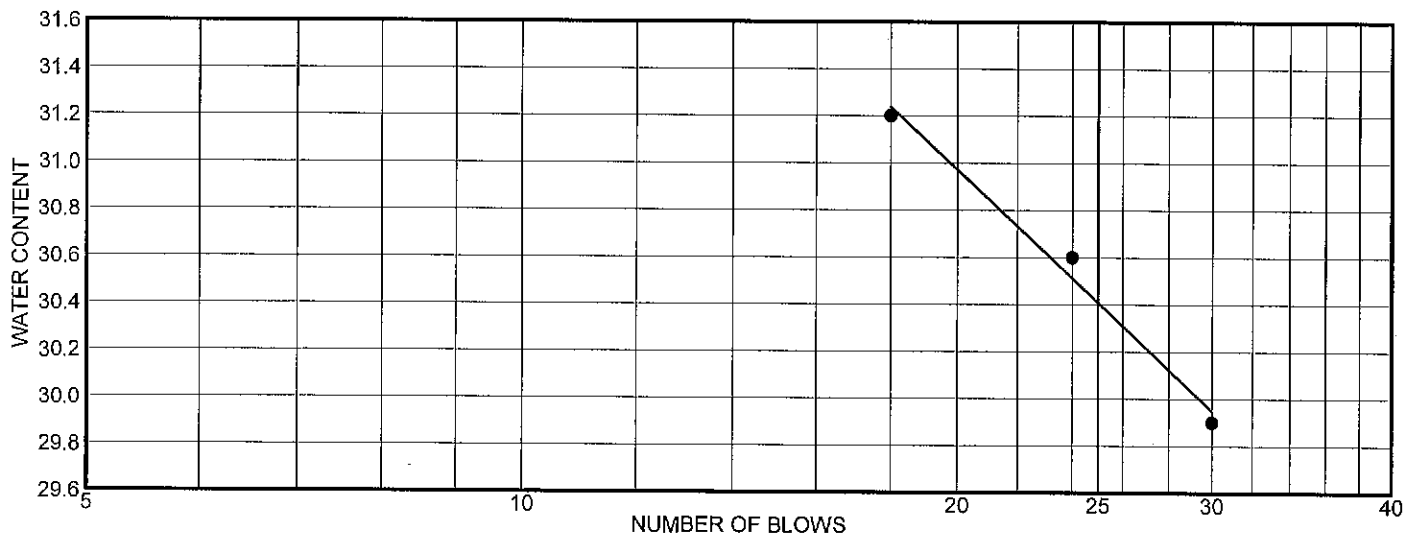
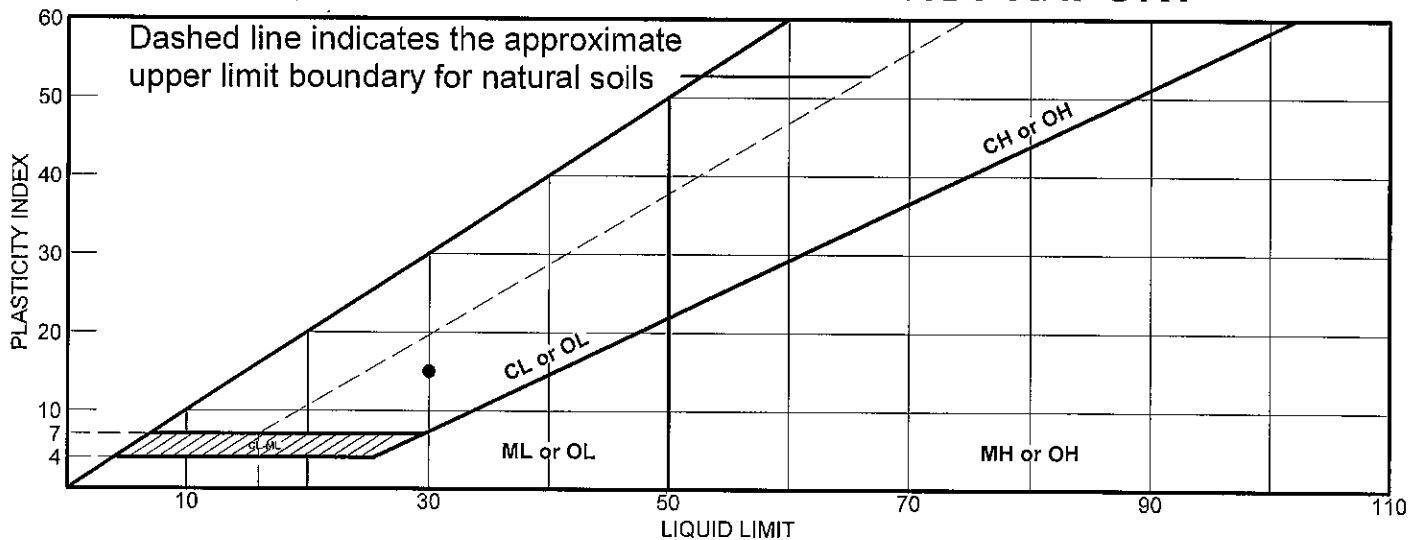
Terracon

Client: WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 5866

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	Brown Lean clay	30	15	15	97.6	86.2	CL

Project No. 35097116 Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

• Source: 5866

Sample No.: PR-5

Remarks:

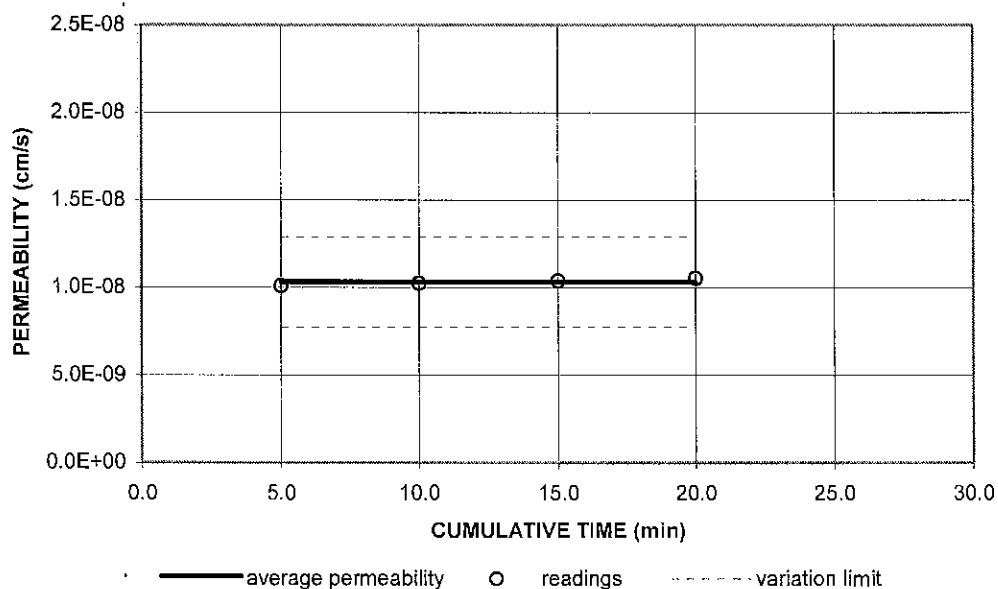
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LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 5866

FLEXIBLE WALL PERMEABILITY TEST



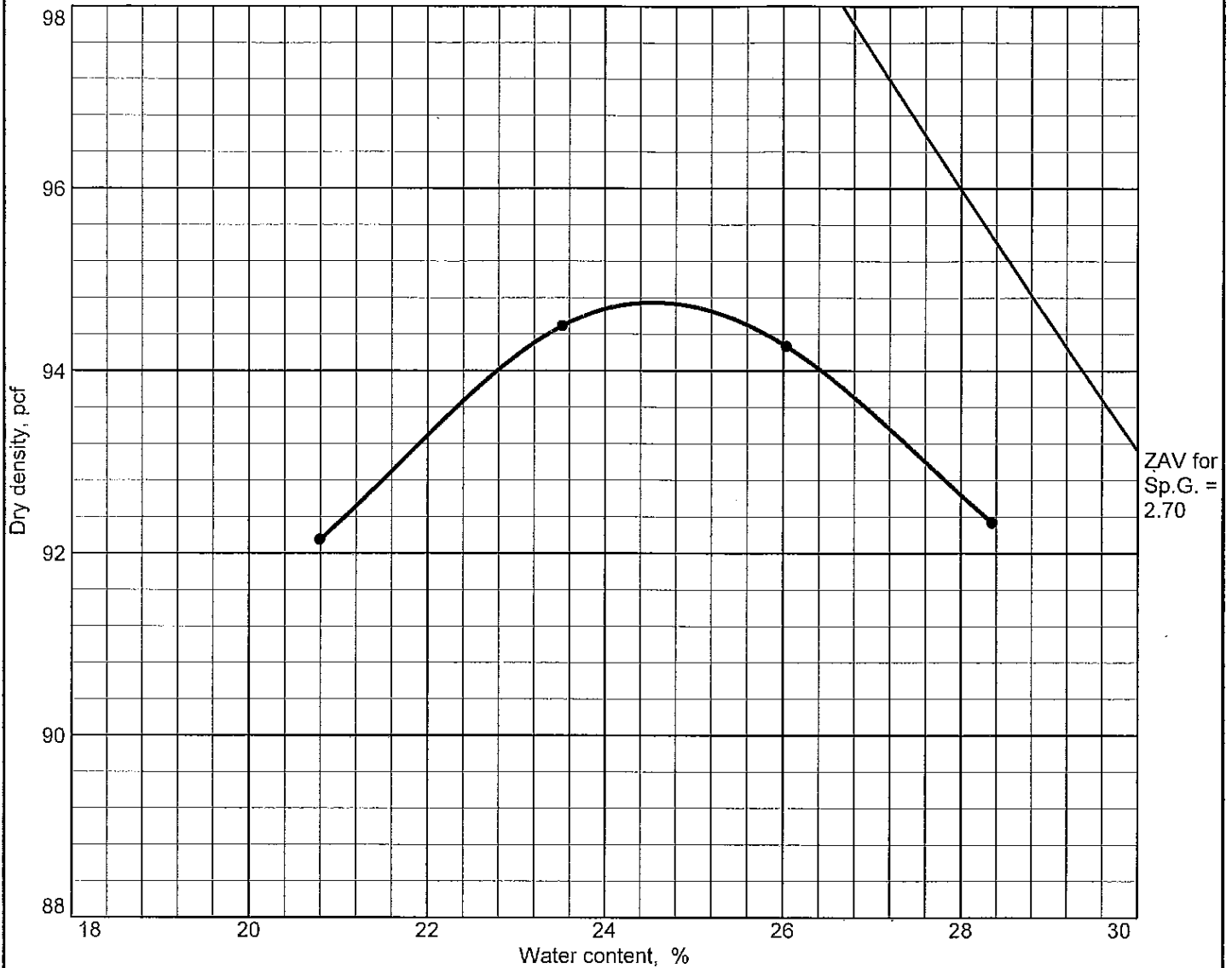
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.43	1.01E-08	1.0E-08
21.00	5.00	10.00	13.24	1.02E-08	
21.00	5.00	15.00	13.06	1.04E-08	
21.00	5.00	20.00	12.87	1.05E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	111.3	Specimen Height, (inches)		3.00	2.98
Opti. M.C., (%)	15.4	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		18.44	38.44
% Recompt.	94.9	Percent Saturation (%)		83.68	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		125.10	147.20
Backpressure	90.00	Dry Mass Density (pcf)		105.62	106.33
Cell pressure	100.00	Void Ratio		0.60	1.04
Eff. Stress	10.00	Calculated Porosity, %		37.31	50.93

USCS		LL	PI
Permeant Used:	WATER	Remarks	BROWN LEAN CLAY
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5866		
Sample Location	PR-5		
Date	8/24/2009	Lab No. 5866	

COMPACTION TEST REPORT

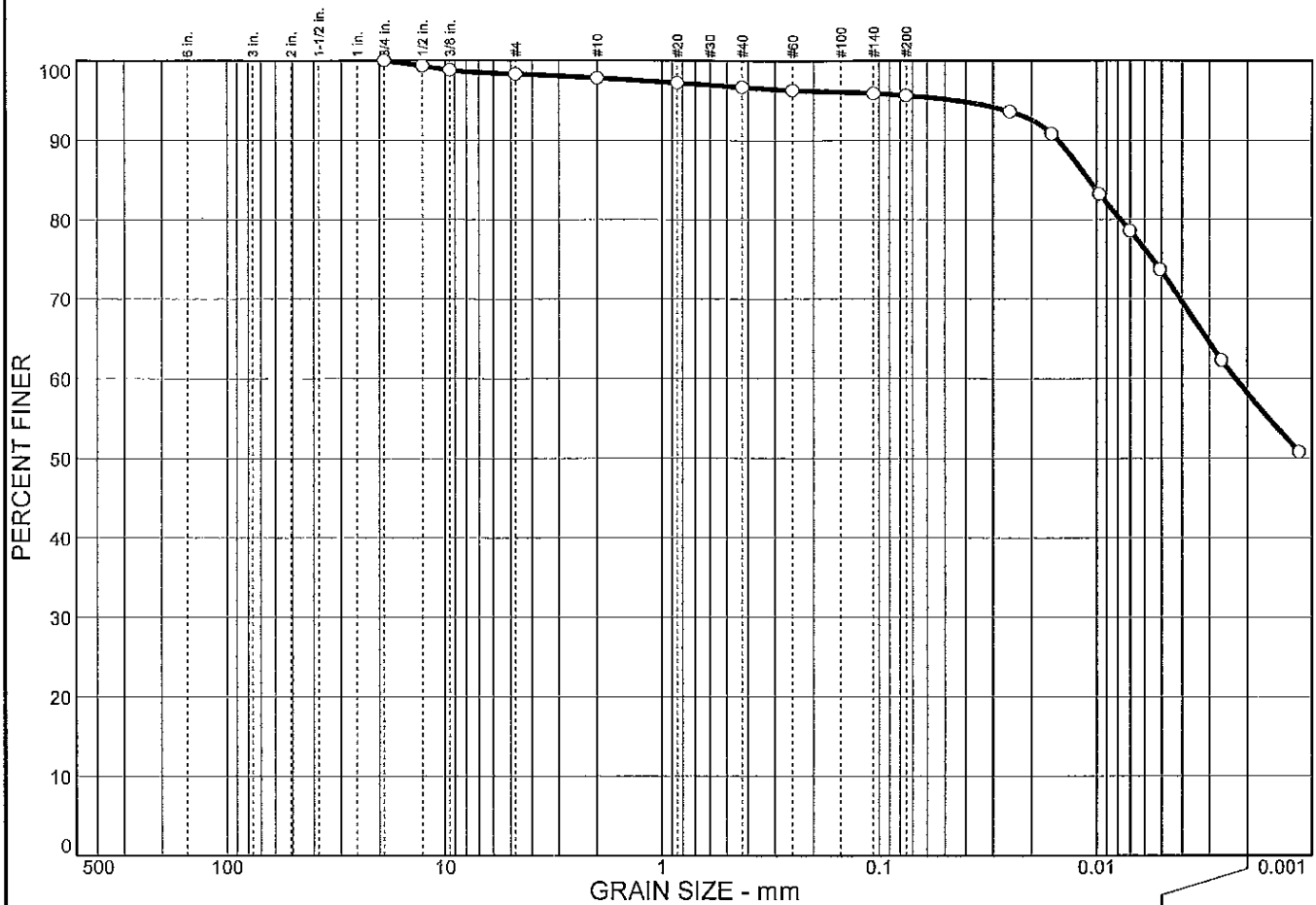


Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	CH				63	38	1.2	95.6

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 94.8 pcf		Brown Fat clay	
Optimum moisture = 24.6 %			
Project No. 35097116 Client: WASTE MANAGEMENT INC Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA NORTH LITTLE ROCK, AR ● Source: 6079			

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.7	2.7	37.4	58.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	99.3		
.375 in.	98.8		
#4	98.3		
#10	97.8		
#20	97.2		
#40	96.7		
#60	96.3		
#140	95.9		
#200	95.6		

* (no specification provided)

Material Description

Brown Fat clay

Atterberg Limits

PL= 25

LL= 63

PI= 38

Coefficients

D₈₅= 0.0109

D₆₀= 0.0023

D₅₀=

D₃₀=

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= CH

AASHTO=

Remarks

Sample No.: PR-6

Location:

Source of Sample: 6079

Date: 9-1-09

Elev./Depth:

Terracon

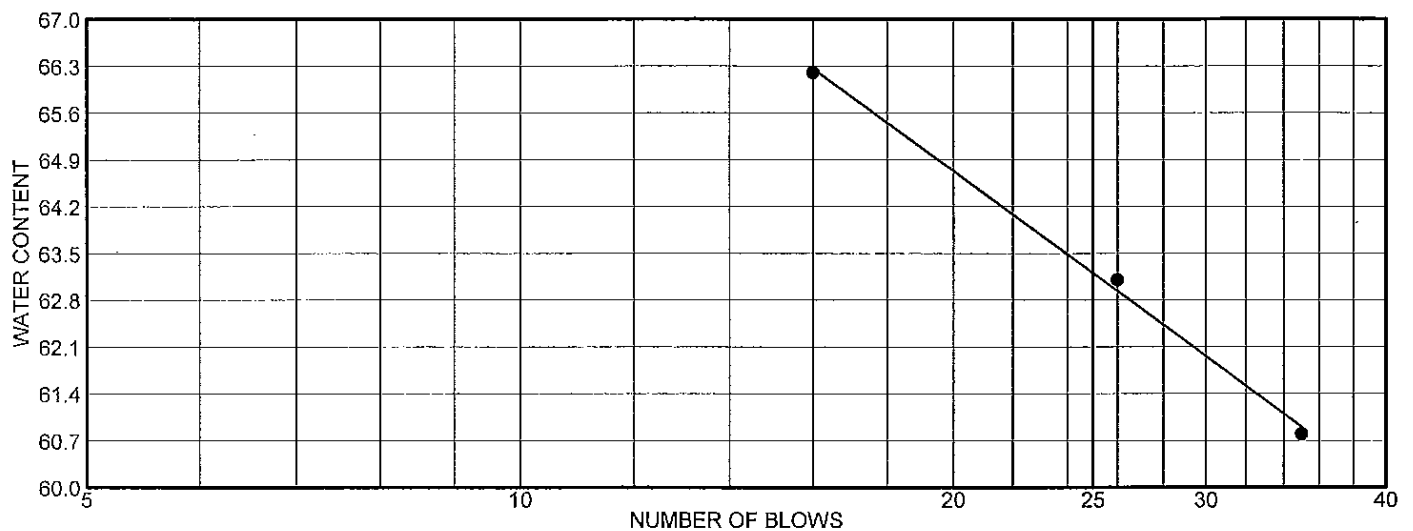
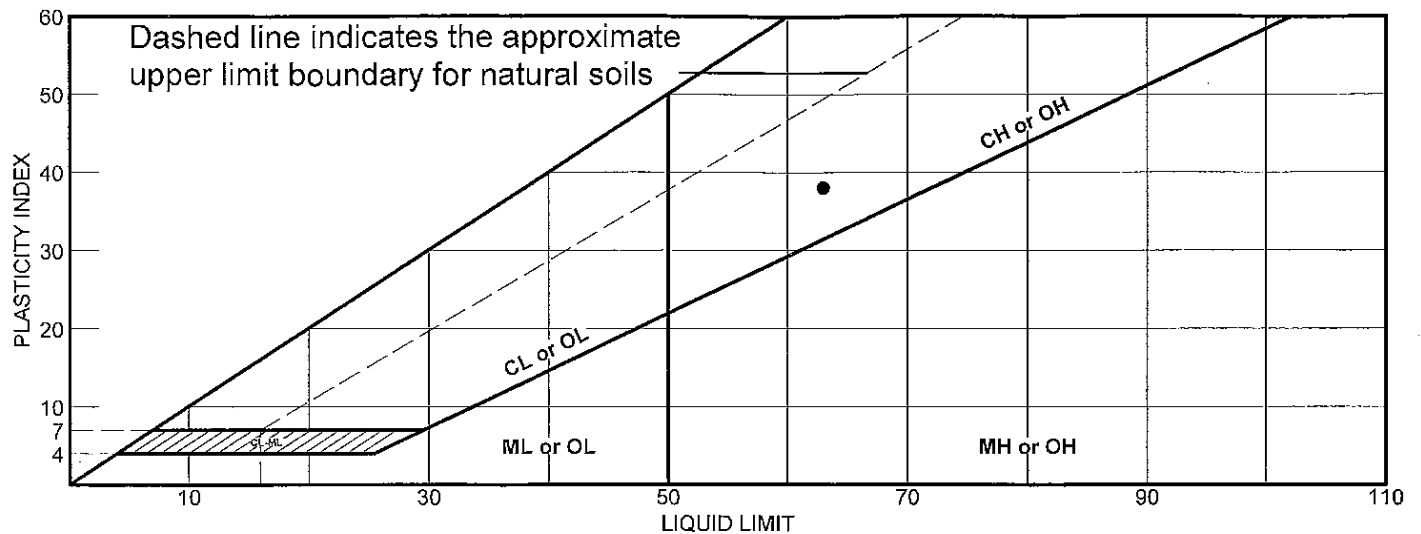
Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 6079

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	Brown Fat clay	63	25	38	96.7	95.6	CH

Project No. 35097116 Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

• Source: 6079

Sample No.: PR-6

Remarks:

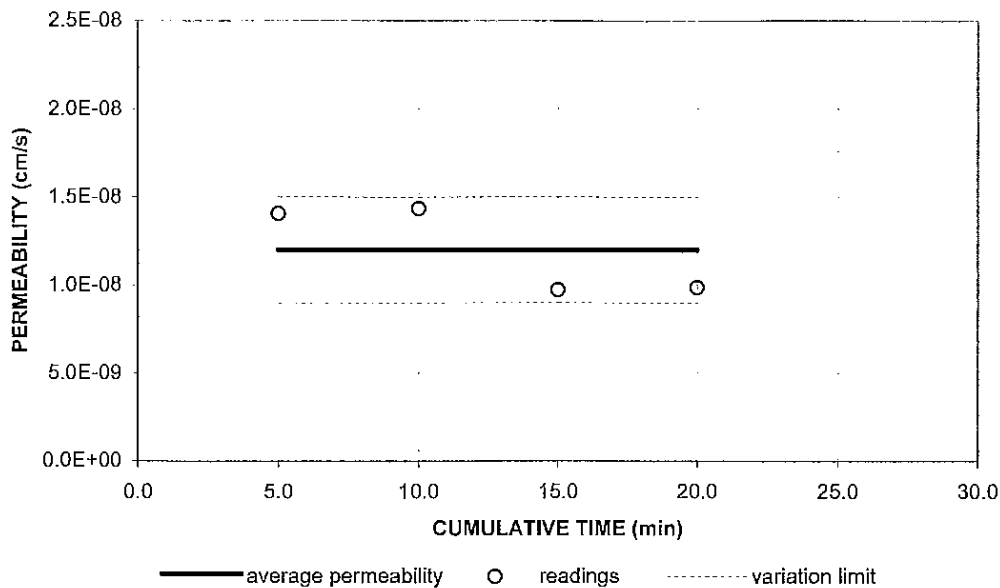
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LIQUID AND PLASTIC LIMITS TEST REPORT

Terracon

Figure 6079

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.45	1.40E-08	1.2E-08
21.00	5.00	10.00	14.17	1.43E-08	
21.00	5.00	15.00	13.99	9.70E-09	
21.00	5.00	20.00	13.80	9.83E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)	94.8	Specimen Height, (inches)		2.98	2.96
Opti. M.C., (%)	24.6	Specimen Diameter, (inches)		4.00	4.00
Comp. Method		Moisture Content, (%)		27.66	29.76
% Recompt.	95.4	Percent Saturation (%)		86.55	94.51
Test Pressures (psi)		Wet Mass Density (pcf)		115.46	118.16
Backpressure	90.00	Dry Mass Density (pcf)		90.44	91.05
Cell pressure	100.00	Void Ratio		0.86	0.85
Eff. Stress	10.00	Calculated Porosity, %		46.32	45.96

USCS		LL		PI	
Permeant Used: WATER		Remarks		Br Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG	
Client		WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number		S-6079			
Sample Location		PR-6			
Date		9/1/2009 Lab No. 6079			

APPENDIX E

FIELD DENSITY/MOISTURE TEST RESULTS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
CS-4	Red-Brown Lean Clay	107.4	18.1

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-1	1st Lift Subgrade	183550	1267720	N/A	CS-1	128.5	106.4	106.9	99.5	95.0	20.8	16.4	PASS
SG-2	1st Lift Subgrade	183650	1267730	N/A	CS-4	128.4	105.9	107.4	98.6	95.0	21.2	18.1	PASS
SG-3	1st Lift Subgrade	183750	1267740	N/A	CS-4	124.1	103.0	107.4	95.9	95.0	20.5	18.1	PASS
SG-4	1st Lift Subgrade	183850	1267750	N/A	CS-4	123.1	102.5	107.4	95.4	95.0	20.1	18.1	PASS
SG-5	1st Lift Subgrade	183540	1267810	N/A	CS-1	125.5	106.5	106.9	99.7	95.0	17.8	16.4	PASS
SG-6	1st Lift Subgrade	183640	1267820	N/A	CS-1	125.7	103.5	106.9	96.9	95.0	21.4	16.4	PASS
SG-7	1st Lift Subgrade	183740	1267830	N/A	CS-1	127.1	106.1	106.9	99.2	95.0	19.8	16.4	PASS
SG-8	1st Lift Subgrade	183840	1267840	N/A	CS-1	124.2	102.3	106.9	95.7	95.0	21.4	16.4	PASS
SG-9	1st Lift Subgrade	183520	1267905	N/A	CS-1	127.7	106.8	106.9	99.9	95.0	19.6	16.4	PASS
SG-10	1st Lift Subgrade	183610	1267915	N/A	CS-1	125.4	103.7	106.9	97.0	95.0	20.9	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-11	1st Lift Subgrade	183720	1267930	N/A	CS-1	126.4	107.8	106.9	100.9	95.0	17.2	16.4	PASS
SG-12	1st Lift Subgrade	183810	1267950	N/A	CS-1	125.9	106.0	106.9	99.1	95.0	18.8	16.4	PASS
SG-13	1st Lift Subgrade	183510	1268005	N/A	CS-1	124.8	103.7	106.9	97.0	95.0	20.4	16.4	PASS
SG-14	1st Lift Subgrade	183600	1268015	N/A	CS-1	128.9	106.7	106.9	99.8	95.0	20.8	16.4	PASS
SG-15	1st Lift Subgrade	183700	1268030	N/A	CS-1	124.8	102.1	106.9	95.5	95.0	22.2	16.4	PASS
SG-16	1st Lift Subgrade	183790	1268050	N/A	CS-1	128.3	105.4	106.9	98.6	95.0	21.7	16.4	PASS
SG-17	1st Lift Subgrade	183500	1268100	N/A	CS-1	127.9	105.6	106.9	98.8	95.0	21.1	16.4	PASS
SG-18	1st Lift Subgrade	183580	1268110	N/A	CS-1	126.0	104.8	106.9	98.1	95.0	20.2	16.4	PASS
SG-19	1st Lift Subgrade	183675	1268125	N/A	CS-1	124.9	102.5	106.9	95.9	95.0	21.8	16.4	PASS
SG-20	1st Lift Subgrade	183770	1268160	N/A	CS-1	125.0	102.5	106.9	95.9	95.0	21.9	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/25/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-5	Brown Fat Clay	91.4	25.7

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-21	1st Lift Subgrade	183475	1268200	N/A	CS-5	119.1	90.8	91.4	99.4	95.0	31.1	25.7	PASS
SG-22	1st Lift Subgrade	183570	1268220	N/A	CS-5	113.4	88.1	91.4	96.4	95.0	28.7	25.7	PASS
SG-23	1st Lift Subgrade	183670	1268235	N/A	CS-5	113.3	88.6	91.4	96.9	95.0	27.9	25.7	PASS
SG-24	1st Lift Subgrade	183765	1268250	N/A	CS-5	113.0	87.9	91.4	96.1	95.0	28.6	25.7	PASS
SG-25	1st Lift Subgrade	183550	1268310	N/A	CS-5	115.6	87.4	91.4	95.7	95.0	32.2	25.7	PASS
SG-26	1st Lift Subgrade	183645	1268330	N/A	CS-5	113.1	89.1	91.4	97.4	95.0	27.0	25.7	PASS
SG-27	1st Lift Subgrade	183740	1268350	N/A	CS-5	115.2	89.8	91.4	98.2	95.0	28.3	25.7	PASS
SG-28	1st Lift Subgrade	183650	1268430	N/A	CS-5	110.2	91.2	91.4	99.8	95.0	20.8	25.7	PASS
SG-29	1st Lift Subgrade	183725	1268450	N/A	CS-5	113.2	89.1	91.4	97.4	95.0	27.1	25.7	PASS
SG-30	1st Lift Subgrade	183730	1268530	N/A	CS-5	112.2	92.6	91.4	101.3	95.0	21.2	25.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/12/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
PR-1	Brown Lean Clay	108.4	17.1

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-31	2nd Lift Subgrade	183550	1267720	N/A	PR-1	127.5	108.9	108.4	100.4	95.0	17.1	17.1	PASS
SG-32	2nd Lift Subgrade	183650	1267730	N/A	CS-1	121.9	102.9	106.9	96.2	95.0	18.5	16.4	PASS
SG-33	2nd Lift Subgrade	183750	1267740	N/A	PR-1	125.8	104.8	108.4	96.7	95.0	20.0	17.1	PASS
SG-34	2nd Lift Subgrade	183850	1267750	N/A	CS-1	122.9	101.9	106.9	95.3	95.0	20.6	16.4	PASS
SG-35	2nd Lift Subgrade	183540	1267810	N/A	CS-1	123.2	101.9	106.9	95.3	95.0	20.9	16.4	PASS
SG-36	2nd Lift Subgrade	183640	1267820	N/A	PR-1	125.9	105.6	108.4	97.4	95.0	19.2	17.1	PASS
SG-37	2nd Lift Subgrade	183740	1267830	N/A	PR-1	128.6	107.2	108.4	98.9	95.0	20.0	17.1	PASS
SG-38	2nd Lift Subgrade	183840	1267540	N/A	PR-1	120.7	104.4	108.4	96.3	95.0	15.6	17.1	PASS
SG-39	2nd Lift Subgrade	183520	1267905	N/A	PR-1	125.7	105.5	108.4	97.4	95.0	19.1	17.1	PASS
SG-40	2nd Lift Subgrade	183610	1267915	N/A	PR-1	125.0	105.4	108.4	97.2	95.0	18.6	17.1	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/12/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-41	2nd Lift Subgrade	183720	1267930	N/A	CS-1	123.4	103.7	106.9	97.0	95.0	19.0	16.4	PASS
SG-42	2nd Lift Subgrade	183810	1267950	N/A	CS-1	125.0	102.5	106.9	95.9	95.0	21.9	16.4	PASS
SG-43	2nd Lift Subgrade	183510	1268005	N/A	CS-1	125.3	102.0	106.9	95.4	95.0	22.8	16.4	PASS
SG-44	2nd Lift Subgrade	183600	1268015	N/A	CS-1	126.1	104.7	106.9	98.0	95.0	20.4	16.4	PASS
SG-45	2nd Lift Subgrade	183700	1268030	N/A	CS-1	124.9	102.5	106.9	95.9	95.0	21.8	16.4	PASS
SG-46	2nd Lift Subgrade	183790	1268050	N/A	CS-1	124.2	102.1	106.9	95.5	95.0	21.7	16.4	PASS
SG-47	2nd Lift Subgrade	183500	1268100	N/A	CS-1	125.7	103.5	106.9	96.9	95.0	21.4	16.4	PASS
SG-48	2nd Lift Subgrade	183580	1268110	N/A	CS-1	124.8	103.7	106.9	97.0	95.0	20.4	16.4	PASS
SG-49	2nd Lift Subgrade	183675	1268125	N/A	CS-1	127.9	105.6	106.9	98.8	95.0	21.1	16.4	PASS
SG-50	2nd Lift Subgrade	183770	1268160	N/A	CS-1	125.9	105.6	106.9	98.8	95.0	19.2	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/28/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 3:00 PM
Arrive Site: 7:30 AM Arrive Lab: 4:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-6	Reddish Brown Fat Clay	94.7	25.2
PR-2	Dark Brown Fat Clay	92.4	27.5

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-51	2nd Lift Subgrade	183475	1268200	N/A	CS-6	116.6	93.4	94.7	98.6	95.0	24.9	25.2	PASS
SG-52	2nd Lift Subgrade	183570	1268220	N/A	CS-6	121.0	97.0	94.7	102.5	95.0	24.7	25.2	PASS
SG-53	2nd Lift Subgrade	183670	1268235	N/A	CS-6	119.2	95.0	94.7	100.3	95.0	25.5	25.2	PASS
SG-54	2nd Lift Subgrade	183765	1268250	N/A	PR-2	114.4	90.5	92.4	98.0	95.0	26.4	27.5	PASS
SG-55	2nd Lift Subgrade	183550	1268310	N/A	PR-2	118.5	92.4	92.4	100.0	95.0	28.2	27.5	PASS
SG-56	2nd Lift Subgrade	183645	1268330	N/A	CS-6	119.7	94.8	94.7	100.2	95.0	26.2	25.2	PASS
SG-57	2nd Lift Subgrade	183740	1268350	N/A	PR-2	116.4	92.5	92.4	100.1	95.0	25.8	27.5	PASS
SG-58	2nd Lift Subgrade	183650	1268430	N/A	PR-2	116.3	91.7	92.4	99.3	95.0	26.8	27.5	PASS
SG-59	2nd Lift Subgrade	183725	1268450	N/A	CS-6	118.3	93.6	94.7	98.8	95.0	26.4	25.2	PASS
SG-60	2nd Lift Subgrade	183730	1268530	N/A	CS-6	119.7	95.2	94.7	100.6	95.0	25.7	25.2	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/18/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-5	Brown Fat Clay	91.4	25.7
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-61	3rd Lift Subgrade	183550	1267720	N/A	CS-5	113.3	91.1	91.4	99.6	95.0	24.4	25.7	PASS
SG-62	3rd Lift Subgrade	183650	1267730	N/A	CS-5	116.2	92.4	91.4	101.1	95.0	25.8	25.7	PASS
SG-63	3rd Lift Subgrade	183750	1267740	N/A	CS-5	115.5	92.3	91.4	101.0	95.0	25.1	25.7	PASS
SG-64	3rd Lift Subgrade	183850	1267750	N/A	CS-6	118.7	96.1	94.7	101.4	95.0	23.6	25.2	PASS
SG-65	3rd Lift Subgrade	183540	1267810	N/A	CS-6	115.8	91.7	94.7	96.8	95.0	26.3	25.2	PASS
SG-66	3rd Lift Subgrade	183640	1267820	N/A	CS-6	118.9	94.7	94.7	100.0	95.0	25.6	25.2	PASS
SG-67	3rd Lift Subgrade	183740	1267830	N/A	CS-6	118.1	92.5	94.7	97.7	95.0	27.7	25.2	PASS
SG-68	3rd Lift Subgrade	183840	1267840	N/A	CS-5	110.6	89.0	91.4	97.4	95.0	24.2	25.7	PASS
SG-69	3rd Lift Subgrade	183520	1267905	N/A	CS-6	117.4	93.5	94.7	98.7	95.0	25.6	25.2	PASS
SG-70	3rd Lift Subgrade	183610	1267915	N/A	CS-5	119.0	91.4	91.4	100.0	95.0	30.2	25.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/18/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-5	Brown Fat Clay	91.4	25.7
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-71	3rd Lift Subgrade	183720	1267930	N/A	CS-5	110.7	88.2	91.4	96.5	95.0	25.5	25.7	PASS
SG-72	3rd Lift Subgrade	183810	1267950	N/A	CS-5	110.7	89.0	91.4	97.4	95.0	24.4	25.7	PASS
SG-73	3rd Lift Subgrade	183510	1268005	N/A	CS-5	105.3	86.9	91.4	95.1	95.0	21.2	25.7	PASS
SG-74	3rd Lift Subgrade	183600	1268015	N/A	CS-6	110.8	90.2	94.7	95.3	95.0	22.8	25.2	PASS
SG-75	3rd Lift Subgrade	183700	1268030	N/A	CS-6	116.5	93.3	94.7	98.5	95.0	24.9	25.2	PASS
SG-76	3rd Lift Subgrade	183790	1268050	N/A	CS-5	110.9	88.4	91.4	96.7	95.0	25.5	25.7	PASS
SG-77	3rd Lift Subgrade	183500	1268100	N/A	CS-5	110.9	88.0	91.4	96.3	95.0	26.0	25.7	PASS
SG-78	3rd Lift Subgrade	183580	1268110	N/A	CS-5	109.0	87.6	91.4	95.8	95.0	24.5	25.7	PASS
SG-79	3rd Lift Subgrade	183675	1268125	N/A	CS-5	111.5	88.6	91.4	97.0	95.0	25.8	25.7	PASS
SG-80	3rd Lift Subgrade	183770	1268160	N/A	CS-5	112.8	88.5	91.4	96.8	95.0	27.5	25.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 5:00 PM
Arrive Site: 7:30 AM Arrive Lab: 6:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
PR-1	Brown Lean Clay	108.4	17.1

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-81	3rd Lift Subgrade	183475	1268200	N/A	PR-1	123.7	107.1	108.4	98.8	95.0	15.5	17.1	PASS
SG-82	3rd Lift Subgrade	183570	1268220	N/A	CS-1	118.8	102.1	106.9	95.6	95.0	16.3	16.4	PASS
SG-83	3rd Lift Subgrade	183670	1268235	N/A	CS-1	117.4	102.8	106.9	96.2	95.0	14.2	16.4	PASS
SG-84	3rd Lift Subgrade	183765	1268250	N/A	PR-1	120.6	104.7	108.4	96.6	95.0	15.2	17.1	PASS
SG-85	3rd Lift Subgrade	183550	1268310	N/A	PR-1	121.9	105.1	108.4	96.9	95.0	16.0	17.1	PASS
SG-86	3rd Lift Subgrade	183645	1268330	N/A	PR-1	119.9	104.2	108.4	96.1	95.0	15.1	17.1	PASS
SG-87	3rd Lift Subgrade	183740	1268350	N/A	PR-1	123.9	105.4	108.4	97.2	95.0	17.6	17.1	PASS
SG-88	3rd Lift Subgrade	183650	1268430	N/A	PR-1	123.5	105.6	108.4	97.4	95.0	17.0	17.1	PASS
SG-89	3rd Lift Subgrade	183725	1268450	N/A	PR-1	122.3	105.9	108.4	97.7	95.0	15.5	17.1	PASS
SG-90	3rd Lift Subgrade	183730	1268530	N/A	PR-1	120.3	105.2	108.4	97.0	95.0	14.4	17.1	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/22/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-5	Brown Fat Clay	91.4	25.7
PC-2	Brown Fat Clay	94.2	25.0

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-91	4th Lift Subgrade	183550	1267720	N/A	CS-5	116.0	92.9	91.4	101.7	95.0	24.8	25.7	PASS
SG-92	4th Lift Subgrade	183650	1267730	N/A	CS-5	115.6	92.0	91.4	100.7	95.0	25.6	25.7	PASS
SG-93	4th Lift Subgrade	183750	1267740	N/A	CS-5	106.7	90.7	91.4	99.3	95.0	17.6	25.7	PASS
SG-94	4th Lift Subgrade	183850	1267750	N/A	PC-2	112.4	91.8	94.2	97.4	95.0	22.5	25.0	PASS
SG-95	4th Lift Subgrade	183540	1267810	N/A	CS-5	116.0	91.3	91.4	99.9	95.0	27.1	25.7	PASS
SG-96	4th Lift Subgrade	183640	1267820	N/A	CS-5	117.2	93.5	91.4	102.3	95.0	25.4	25.7	PASS
SG-97	4th Lift Subgrade	183740	1267830	N/A	CS-5	112.3	91.4	91.4	100.1	95.0	22.8	25.7	PASS
SG-98	4th Lift Subgrade	183840	1267540	N/A	CS-5	120.5	92.5	91.4	101.2	95.0	30.3	25.7	PASS
SG-99	4th Lift Subgrade	183520	1267905	N/A	CS-5	121.0	95.6	91.4	104.6	95.0	26.6	25.7	PASS
SG-100	4th Lift Subgrade	183610	1267915	N/A	CS-5	109.0	87.7	91.4	95.9	95.0	24.3	25.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/25/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-5	Brown Fat Clay	91.4	25.7
CS-6	Reddish Brown Fat Clay	94.7	25.2
PR-2	Dark Brown Fat Clay	92.4	27.5

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-101	4th Lift Subgrade	183720	1267930	N/A	CS-5	119.6	91.2	91.4	99.7	95.0	31.2	25.7	PASS
SG-102	4th Lift Subgrade	183810	1267950	N/A	CS-5	113.0	87.9	91.4	96.1	95.0	28.6	25.7	PASS
SG-103	4th Lift Subgrade	183510	1268005	N/A	CS-5	111.6	86.8	91.4	95.0	95.0	28.5	25.7	PASS
SG-104	4th Lift Subgrade	183600	1268015	N/A	CS-6	115.8	91.3	94.7	96.4	95.0	26.9	25.2	PASS
SG-105	4th Lift Subgrade	183700	1268030	N/A	CS-5	118.8	90.8	91.4	99.4	95.0	30.8	25.7	PASS
SG-106	4th Lift Subgrade	183790	1268050	N/A	CS-6	118.7	96.0	94.7	101.4	95.0	23.6	25.2	PASS
SG-107	4th Lift Subgrade	183500	1268100	N/A	CS-5	110.4	90.3	91.4	98.8	95.0	22.3	25.7	PASS
SG-108	4th Lift Subgrade	183580	1268110	N/A	PR-2	117.0	92.9	92.4	100.6	95.0	25.9	27.5	PASS
SG-109	4th Lift Subgrade	183675	1268125	N/A	CS-5	115.2	89.8	91.4	98.2	95.0	28.3	25.7	PASS
SG-110	4th Lift Subgrade	183770	1268160	N/A	PR-2	118.1	92.5	92.4	100.1	95.0	27.7	27.5	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 5:00 PM
Arrive Site: 7:30 AM Arrive Lab: 6:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-1	Brown Lean Clay	108.4	17.1
CS-1	Brown Lean Clay	106.9	16.4

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-111	4th Lift Subgrade	183475	1268200	N/A	CS-1	119.0	102.8	106.9	96.1	95.0	15.8	16.4	PASS
SG-112	4th Lift Subgrade	183570	1268220	N/A	CS-1	121.4	102.5	106.9	95.9	95.0	18.4	16.4	PASS
SG-113	4th Lift Subgrade	183670	1268235	N/A	PR-1	120.8	105.1	108.4	97.0	95.0	14.9	17.1	PASS
SG-114	4th Lift Subgrade	183765	1268250	N/A	PR-1	121.5	104.5	108.4	96.4	95.0	16.3	17.1	PASS
SG-115	4th Lift Subgrade	183550	1268310	N/A	CS-1	118.6	103.7	106.9	97.0	95.0	14.4	16.4	PASS
SG-116	4th Lift Subgrade	183645	1268330	N/A	CS-1	116.9	101.9	106.9	95.3	95.0	14.7	16.4	PASS
SG-117	4th Lift Subgrade	183740	1268350	N/A	PR-1	124.0	105.7	108.4	97.5	95.0	17.3	17.1	PASS
SG-118	4th Lift Subgrade	183650	1268430	N/A	PR-1	125.4	107.5	108.4	99.2	95.0	16.6	17.1	PASS
SG-119	4th Lift Subgrade	183725	1268450	N/A	PR-1	122.9	104.8	108.4	96.7	95.0	17.3	17.1	PASS
SG-120	4th Lift Subgrade	183730	1268530	N/A	CS-1	118.4	103.4	106.9	96.7	95.0	14.5	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/26/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 7:00 AM Depart Site: 7:00 PM
Arrive Site: 8:00 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-121	5th Lift Subgrade	183550	1267720	N/A	CS-6	122.8	98.9	94.7	104.4	95.0	24.2	25.2	PASS
SG-122	5th Lift Subgrade	183650	1267730	N/A	CS-6	121.9	97.8	94.7	103.2	95.0	24.7	25.2	PASS
SG-123	5th Lift Subgrade	183750	1267740	N/A	CS-6	119.0	93.4	94.7	98.6	95.0	27.4	25.2	PASS
SG-124	5th Lift Subgrade	183850	1267750	N/A	CS-6	117.1	92.6	94.7	97.8	95.0	26.4	25.2	PASS
SG-125	5th Lift Subgrade	183540	1267810	N/A	CS-6	120.2	96.1	94.7	101.5	95.0	25.1	25.2	PASS
SG-126	5th Lift Subgrade	183640	1267820	N/A	CS-6	121.5	95.6	94.7	100.9	95.0	27.1	25.2	PASS
SG-127	5th Lift Subgrade	183740	1267830	N/A	CS-6	118.3	94.6	94.7	99.9	95.0	25.1	25.2	PASS
SG-128	5th Lift Subgrade	183840	1267540	N/A	CS-6	120.1	95.8	94.7	101.1	95.0	25.4	25.2	PASS
SG-129	5th Lift Subgrade	183520	1267905	N/A	CS-6	115.8	94.8	94.7	100.1	95.0	22.1	25.2	PASS
SG-130	5th Lift Subgrade	183610	1267915	N/A	CS-6	119.5	95.8	94.7	101.1	95.0	24.8	25.2	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/26/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 7:00 AM Depart Site: 7:00 PM
Arrive Site: 8:00 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-131	5th Lift Subgrade	183720	1267930	N/A	CS-6	120.1	96.7	94.7	102.1	95.0	24.2	25.2	PASS
SG-132	5th Lift Subgrade	183810	1267950	N/A	CS-6	119.5	92.1	94.7	97.3	95.0	29.7	25.2	PASS
SG-133	5th Lift Subgrade	183510	1268005	N/A	CS-6	120.9	95.8	94.7	101.2	95.0	26.2	25.2	PASS
SG-134	5th Lift Subgrade	183600	1268015	N/A	CS-6	119.9	96.5	94.7	101.9	95.0	24.3	25.2	PASS
SG-135	5th Lift Subgrade	183700	1268030	N/A	CS-6	116.7	91.7	94.7	96.9	95.0	27.2	25.2	PASS
SG-136	5th Lift Subgrade	183790	1268050	N/A	CS-6	119.2	93.9	94.7	99.1	95.0	27.0	25.2	PASS
SG-137	5th Lift Subgrade	183500	1268100	N/A	CS-6	122.5	98.7	94.7	104.2	95.0	24.1	25.2	PASS
SG-138	5th Lift Subgrade	183580	1268110	N/A	CS-6	121.5	96.0	94.7	101.4	95.0	26.5	25.2	PASS
SG-139	5th Lift Subgrade	183675	1268125	N/A	CS-6	119.0	94.1	94.7	99.3	95.0	26.5	25.2	PASS
SG-140	5th Lift Subgrade	183770	1268160	N/A	CS-6	116.6	92.8	94.7	98.0	95.0	25.6	25.2	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/20/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 6:00 PM
Arrive Site: 7:30 AM Arrive Lab: 7:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-141	5th Lift Subgrade	183475	1268200	N/A	PR-2	116.8	89.0	92.4	96.3	95.0	31.3	27.5	PASS
SG-142	5th Lift Subgrade	183570	1268220	N/A	PR-2	112.8	88.1	92.4	95.4	95.0	28.0	27.5	PASS
SG-143	5th Lift Subgrade	183670	1268235	N/A	PR-2	114.8	88.6	92.4	95.9	95.0	29.5	27.5	PASS
SG-144	5th Lift Subgrade	183765	1268250	N/A	PR-2	115.8	88.3	92.4	95.6	95.0	31.1	27.5	PASS
SG-145	5th Lift Subgrade	183550	1268310	N/A	PR-2	117.5	91.6	92.4	99.1	95.0	28.3	27.5	PASS
SG-146	5th Lift Subgrade	183645	1268330	N/A	PR-2	114.1	88.4	92.4	95.7	95.0	29.1	27.5	PASS
SG-147	5th Lift Subgrade	183740	1268350	N/A	PR-2	116.4	89.3	92.4	96.7	95.0	30.3	27.5	PASS
SG-148	5th Lift Subgrade	183650	1268430	N/A	PR-2	117.6	89.2	92.4	96.6	95.0	31.8	27.5	PASS
SG-149	5th Lift Subgrade	183725	1268450	N/A	PR-2	116.1	89.6	92.4	97.0	95.0	29.6	27.5	PASS
SG-150	5th Lift Subgrade	183730	1268530	N/A	PR-2	111.4	88.1	92.4	95.4	95.0	26.5	27.5	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/30/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PC-2	Brown Fat Clay	94.2	25.0
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-151	6th Lift Subgrade	183550	1267720	N/A	CS-6	115.5	92.4	94.7	97.6	95.0	25.0	25.2	PASS
SG-152	6th Lift Subgrade	183650	1267730	N/A	CS-6	117.2	93.2	94.7	98.4	95.0	25.8	25.2	PASS
SG-153	6th Lift Subgrade	183750	1267740	N/A	PC-2	115.6	91.0	94.2	96.6	95.0	27.0	25.0	PASS
SG-154	6th Lift Subgrade	183850	1267750	N/A	PC-2	117.3	93.0	94.2	98.7	95.0	26.1	25.0	PASS
SG-155	6th Lift Subgrade	183540	1267810	N/A	CS-6	118.1	94.3	94.7	99.6	95.0	25.2	25.2	PASS
SG-156	6th Lift Subgrade	183640	1267820	N/A	CS-6	116.2	92.7	94.7	97.9	95.0	25.3	25.2	PASS
SG-157	6th Lift Subgrade	183740	1267830	N/A	PC-2	115.5	93.0	94.2	98.7	95.0	24.2	25.0	PASS
SG-158	6th Lift Subgrade	183840	1267540	N/A	PC-2	115.3	92.0	94.2	97.7	95.0	25.3	25.0	PASS
SG-159	6th Lift Subgrade	183520	1267905	N/A	CS-6	117.7	92.8	94.7	98.0	95.0	26.8	25.2	PASS
SG-160	6th Lift Subgrade	183610	1267915	N/A	CS-6	115.9	93.2	94.7	98.4	95.0	24.4	25.2	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 6/30/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-3	Dark Brown & Gray Fat Clay	93.5	29.3
CS-6	Reddish Brown Fat Clay	94.7	25.2

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-161	6th Lift Subgrade	183720	1267930	N/A	PR-3	116.7	92.6	93.5	99.1	95.0	26.0	29.3	PASS
SG-162	6th Lift Subgrade	183810	1267950	N/A	PR-3	113.7	90.9	93.5	97.2	95.0	25.1	29.3	PASS
SG-163	6th Lift Subgrade	183510	1268005	N/A	PR-3	116.3	92.8	93.5	99.3	95.0	25.3	29.3	PASS
SG-164	6th Lift Subgrade	183600	1268015	N/A	CS-6	113.8	91.4	94.7	96.5	95.0	24.5	25.2	PASS
SG-165	6th Lift Subgrade	183700	1268030	N/A	PR-3	113.9	90.7	93.5	97.0	95.0	25.6	29.3	PASS
SG-166	6th Lift Subgrade	183790	1268050	N/A	CS-6	116.6	94.3	94.7	99.5	95.0	23.7	25.2	PASS
SG-167	6th Lift Subgrade	183500	1268100	N/A	CS-6	119.1	94.9	94.7	100.2	95.0	25.5	25.2	PASS
SG-168	6th Lift Subgrade	183580	1268110	N/A	PR-3	114.6	91.7	93.5	98.1	95.0	25.0	29.3	PASS
SG-169	6th Lift Subgrade	183675	1268125	N/A	PR-3	112.6	90.9	93.5	97.2	95.0	23.9	29.3	PASS
SG-170	6th Lift Subgrade	183770	1268160	N/A	PR-3	118.1	92.3	93.5	98.8	95.0	27.9	29.3	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/20/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-7	Dark Brown Fat Clay	92.8	27.9
PC-2	Brown Fat Clay	94.2	25.0
CS-5	Brown Fat Clay	91.4	25.7
PR-2	Dark Brown Fat Clay	92.4	27.5

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-171	6th Lift Subgrade	183475	1268200	N/A	PR-2	117.0	91.1	92.4	98.6	95.0	28.4	27.5	PASS
SG-172	6th Lift Subgrade	183570	1268220	N/A	CS-5	113.6	88.1	91.4	96.4	95.0	28.9	25.7	PASS
SG-173	6th Lift Subgrade	183670	1268235	N/A	PC-2	112.8	92.2	94.2	97.9	95.0	22.3	25.0	PASS
SG-174	6th Lift Subgrade	183765	1268250	N/A	PC-2	119.1	95.7	94.2	101.6	95.0	24.4	25.0	PASS
SG-175	6th Lift Subgrade	183550	1268310	N/A	CS-7	118.0	88.6	92.8	95.5	95.0	33.2	27.9	PASS
SG-176	6th Lift Subgrade	183645	1268330	N/A	CS-7	114.2	90.0	92.8	97.0	95.0	26.9	27.9	PASS
SG-177	6th Lift Subgrade	183740	1268350	N/A	PC-2	117.2	95.5	94.2	101.4	95.0	22.7	25.0	PASS
SG-178	6th Lift Subgrade	183650	1268430	N/A	PC-2	118.5	92.4	94.2	98.1	95.0	28.2	25.0	PASS
SG-179	6th Lift Subgrade	183725	1268450	N/A	PC-2	118.5	91.3	94.2	96.9	95.0	29.8	25.0	PASS
SG-180	6th Lift Subgrade	183730	1268530	N/A	PC-2	118.9	96.4	94.2	102.3	95.0	23.4	25.0	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 5:00 PM
Arrive Site: 7:30 AM Arrive Lab: 6:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PC-3	Gray Fat Clay	90.5	27.9
CS-3	Red Brown Lean Clay	107.0	17.7

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-181	1st Lift Subgrade	183900	1267900	N/A	PC-3	111.9	86.9	90.5	96.1	95.0	28.7	27.9	PASS
SG-182	1st Lift Subgrade	183800	1268500	N/A	PC-3	113.5	88.7	90.5	98.0	95.0	28.0	27.9	PASS
SG-183	1st Lift Subgrade	183850	1268200	N/A	CS-3	123.1	107.0	107.0	100.0	95.0	15.1	17.7	PASS
SG-184	2nd Lift Subgrade	183900	1267900	N/A	PC-3	118.0	93.4	90.5	103.2	95.0	26.3	27.9	PASS
SG-185	2nd Lift Subgrade	183850	1268200	N/A	PC-3	115.3	91.7	90.5	101.4	95.0	25.7	27.9	PASS
SG-186	2nd Lift Subgrade	183800	1268500	N/A	CS-3	118.6	102.7	107.0	96.0	95.0	15.5	17.7	PASS
SG-187	3rd Lift Subgrade	183900	1267900	N/A	CS-3	118.9	102.9	107.0	96.1	95.0	15.6	17.7	PASS
SG-188	3rd Lift Subgrade	183850	1268200	N/A	CS-3	120.8	102.1	107.0	95.4	95.0	18.3	17.7	PASS
SG-189	3rd Lift Subgrade	183800	1268500	N/A	CS-3	121.8	102.6	107.0	95.9	95.0	18.7	17.7	PASS
SG-190	4th Lift Subgrade	183900	1267900	N/A	CS-3	123.8	106.1	107.0	99.1	95.0	16.7	17.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
CS-3	Red Brown Lean Clay	107.0	17.7

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-191	4th Lift Subgrade	183850	1268200	N/A	CS-3	121.4	103.7	107.0	96.9	95.0	17.1	17.7	PASS
SG-192	4th Lift Subgrade	183800	1268500	N/A	CS-3	123.9	106.9	107.0	99.9	95.0	15.9	17.7	PASS
SG-193	5th Lift Subgrade	183900	1267900	N/A	CS-3	124.6	103.8	107.0	97.0	95.0	20.0	17.7	PASS
SG-194	5th Lift Subgrade	183850	1268200	N/A	CS-1	125.5	104.6	106.9	97.8	95.0	20.0	16.4	PASS
SG-195	5th Lift Subgrade	183800	1268500	N/A	CS-1	126.8	106.8	106.9	99.9	95.0	18.7	16.4	PASS
SG-196	6th Lift Subgrade	183900	1267900	N/A	CS-1	128.8	107.7	106.9	100.7	95.0	19.6	16.4	PASS
SG-197	6th Lift Subgrade	183850	1268200	N/A	CS-3	125.1	106.2	107.0	99.2	95.0	17.8	17.7	PASS
SG-198	6th Lift Subgrade	183800	1268500	N/A	CS-3	126.3	105.4	107.0	98.5	95.0	19.8	17.7	PASS
SG-199	7th Lift Subgrade	183900	1267900	N/A	CS-3	124.4	103.3	107.0	96.6	95.0	20.4	17.7	PASS
SG-200	7th Lift Subgrade	183850	1268200	N/A	CS-3	124.3	102.0	107.0	95.3	95.0	21.9	17.7	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/8/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PC-2	Brown Fat Clay	94.2	25.0
PC-3	Gray Fat Clay	90.5	27.9

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-201	7th Lift Subgrade	183550	1267720	N/A	PC-2	115.6	91.5	94.2	97.2	95.0	26.3	25.0	PASS
SG-202	7th Lift Subgrade	183650	1267730	N/A	PC-2	118.2	94.8	94.2	100.6	95.0	24.7	25.0	PASS
SG-203	7th Lift Subgrade	183750	1267740	N/A	PC-3	113.5	89.3	90.5	98.7	95.0	27.1	27.9	PASS
SG-204	7th Lift Subgrade	183850	1267750	N/A	PC-2	119.0	93.9	94.2	99.7	95.0	26.7	25.0	PASS
SG-205	7th Lift Subgrade	183540	1267810	N/A	PC-2	115.5	91.4	94.2	97.0	95.0	26.4	25.0	PASS
SG-206	7th Lift Subgrade	183640	1267820	N/A	PC-2	117.6	92.5	94.2	98.2	95.0	27.1	25.0	PASS
SG-207	7th Lift Subgrade	183740	1267830	N/A	PC-2	115.0	92.3	94.2	98.0	95.0	24.6	25.0	PASS
SG-208	7th Lift Subgrade	183840	1267540	N/A	PC-2	118.7	92.4	94.2	98.1	95.0	28.4	25.0	PASS
SG-209	7th Lift Subgrade	183520	1267905	N/A	PC-2	113.4	90.3	94.2	95.8	95.0	25.6	25.0	PASS
SG-210	7th Lift Subgrade	183610	1267915	N/A	PC-2	115.6	92.0	94.2	97.7	95.0	25.6	25.0	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/8/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PC-2	Brown Fat Clay	94.2	25.0

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-211	7th Lift Subgrade	183720	1267930	N/A	PC-2	118.4	93.3	94.2	99.0	95.0	26.9	25.0	PASS
SG-212	7th Lift Subgrade	183810	1267950	N/A	PC-2	118.0	94.8	94.2	100.6	95.0	24.5	25.0	PASS
SG-213	7th Lift Subgrade	183510	1268005	N/A	PC-2	118.9	94.7	94.2	100.5	95.0	25.6	25.0	PASS
SG-214	7th Lift Subgrade	183600	1268015	N/A	PC-2	116.9	94.0	94.2	99.8	95.0	24.3	25.0	PASS
SG-215	7th Lift Subgrade	183700	1268030	N/A	PC-2	119.6	94.5	94.2	100.4	95.0	26.5	25.0	PASS
SG-216	7th Lift Subgrade	183790	1268050	N/A	PC-2	117.2	93.2	94.2	99.0	95.0	25.7	25.0	PASS
SG-217	7th Lift Subgrade	183500	1268100	N/A	PC-2	115.4	91.3	94.2	96.9	95.0	26.4	25.0	PASS
SG-218	7th Lift Subgrade	183580	1268110	N/A	PC-2	114.3	91.2	94.2	96.8	95.0	25.3	25.0	PASS
SG-219	7th Lift Subgrade	183675	1268125	N/A	PC-2	119.9	94.0	94.2	99.8	95.0	27.5	25.0	PASS
SG-220	7th Lift Subgrade	183770	1268160	N/A	PC-2	118.9	95.7	94.2	101.6	95.0	24.2	25.0	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/8/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PC-2	Brown Fat Clay	94.2	25.0
CS-1	Brown Lean Clay	106.9	16.4
CS-7	Dark Brown Fat Clay	92.8	27.9

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-221	7th Lift Subgrade	183475	1268200	N/A	PC-2	119.0	97.6	94.2	103.6	95.0	21.9	25.0	PASS
SG-222	7th Lift Subgrade	183570	1268220	N/A	PC-2	117.5	96.0	94.2	101.9	95.0	22.4	25.0	PASS
SG-223	7th Lift Subgrade	183670	1268235	N/A	PC-2	120.2	96.5	94.2	102.5	95.0	24.5	25.0	PASS
SG-224	7th Lift Subgrade	183765	1268250	N/A	CS-1	128.9	107.5	106.9	100.6	95.0	19.9	16.4	PASS
SG-225	7th Lift Subgrade	183550	1268310	N/A	PC-2	117.9	95.9	94.2	101.8	95.0	22.9	25.0	PASS
SG-226	7th Lift Subgrade	183645	1268330	N/A	PC-2	116.8	94.3	94.2	100.2	95.0	23.8	25.0	PASS
SG-227	7th Lift Subgrade	183740	1268350	N/A	CS-1	124.8	103.0	106.9	96.3	95.0	21.2	16.4	PASS
SG-228	7th Lift Subgrade	183650	1268430	N/A	CS-1	127.9	107.5	106.9	100.5	95.0	19.0	16.4	PASS
SG-229	7th Lift Subgrade	183725	1268450	N/A	CS-1	124.7	103.1	106.9	96.5	95.0	20.9	16.4	PASS
SG-230	7th Lift Subgrade	183730	1268530	N/A	CS-7	120.4	94.9	92.8	102.2	95.0	26.9	27.9	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-1	Brown Lean Clay	108.4	17.1
PR-4	Brown Lean Clay w/sand	115.6	13.7
PR-5	Brown Lean Clay	111.3	15.4
CS-1	Brown Lean Clay	106.9	16.4

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-231	8th Lift Subgrade	183550	1267720	N/A	PR-4	127.6	110.4	115.6	95.5	95.0	15.6	13.7	PASS
SG-232	8th Lift Subgrade	183650	1267730	N/A	PR-5	125.1	107.6	111.3	96.6	95.0	16.3	15.4	PASS
SG-233	8th Lift Subgrade	183750	1267740	N/A	PR-1	124.3	105.1	108.4	96.9	95.0	18.3	17.1	PASS
SG-234	8th Lift Subgrade	183850	1267750	N/A	CS-1	123.5	102.2	106.9	95.6	95.0	20.8	16.4	PASS
SG-235	8th Lift Subgrade	183540	1267810	N/A	PR-5	126.8	109.0	111.3	98.0	95.0	16.3	15.4	PASS
SG-236	8th Lift Subgrade	183640	1267820	N/A	CS-1	122.5	103.0	106.9	96.4	95.0	18.9	16.4	PASS
SG-237	8th Lift Subgrade	183740	1267830	N/A	CS-1	124.4	103.1	106.9	96.4	95.0	20.7	16.4	PASS
SG-238	8th Lift Subgrade	183840	1267540	N/A	PR-4	127.0	110.1	115.6	95.3	95.0	15.3	13.7	PASS
SG-239	8th Lift Subgrade	183520	1267905	N/A	CS-1	123.5	104.1	106.9	97.4	95.0	18.6	16.4	PASS
SG-240	8th Lift Subgrade	183610	1267915	N/A	CS-1	123.6	102.7	106.9	96.1	95.0	20.3	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-241	8th Lift Subgrade	183720	1267930	N/A	CS-1	125.7	106.8	106.9	99.9	95.0	17.7	16.4	PASS
SG-242	8th Lift Subgrade	183810	1267950	N/A	CS-1	122.6	103.1	106.9	96.5	95.0	18.9	16.4	PASS
SG-243	8th Lift Subgrade	183510	1268005	N/A	CS-1	123.3	103.8	106.9	97.1	95.0	18.8	16.4	PASS
SG-244	8th Lift Subgrade	183600	1268015	N/A	CS-1	123.6	103.9	106.9	97.2	95.0	19.0	16.4	PASS
SG-245	8th Lift Subgrade	183700	1268030	N/A	CS-1	125.3	106.5	106.9	99.7	95.0	17.6	16.4	PASS
SG-246	8th Lift Subgrade	183790	1268050	N/A	CS-1	121.1	102.4	106.9	95.8	95.0	18.3	16.4	PASS
SG-247	8th Lift Subgrade	183500	1268100	N/A	CS-1	124.7	102.6	106.9	96.0	95.0	21.5	16.4	PASS
SG-248	8th Lift Subgrade	183580	1268110	N/A	CS-1	121.4	103.7	106.9	97.0	95.0	17.1	16.4	PASS
SG-249	8th Lift Subgrade	183675	1268125	N/A	CS-1	124.9	106.2	106.9	99.4	95.0	17.6	16.4	PASS
SG-250	8th Lift Subgrade	183770	1268160	N/A	CS-1	125.0	104.3	106.9	97.6	95.0	19.8	16.4	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/20/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 6:00 PM
Arrive Site: 7:30 AM Arrive Lab: 7:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
CS-3	Red Brown Lean Clay	107.0	17.7
CS-6	Red Brown Fat Clay	94.7	25.2
CS-7	Dark Brown Fat Clay	92.8	27.9

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-251	9th Lift Subgrade	183550	1267720	N/A	CS-1	128.9	107.5	106.9	100.6	95.0	19.9	16.4	PASS
SG-252	9th Lift Subgrade	183650	1267730	N/A	CS-7	119.3	92.4	92.8	99.6	95.0	29.1	27.9	PASS
SG-253	9th Lift Subgrade	183750	1267740	N/A	CS-1	124.8	103.0	106.9	96.3	95.0	21.2	16.4	PASS
SG-254	9th Lift Subgrade	183850	1267750	N/A	CS-6	120.2	94.7	94.7	100.0	95.0	26.9	25.2	PASS
SG-255	9th Lift Subgrade	183540	1267810	N/A	CS-3	124.3	102.0	107.0	95.3	95.0	21.9	17.7	PASS
SG-256	9th Lift Subgrade	183640	1267820	N/A	CS-7	118.3	90.7	92.8	97.7	95.0	30.5	27.9	PASS
SG-257	9th Lift Subgrade	183740	1267830	N/A	CS-1	127.9	107.5	106.9	100.5	95.0	19.0	16.4	PASS
SG-258	9th Lift Subgrade	183840	1267540	N/A	CS-3	123.9	103.3	107.0	96.5	95.0	20.0	17.7	PASS
SG-259	9th Lift Subgrade	183520	1267905	N/A	CS-7	118.9	91.6	92.8	98.7	95.0	29.8	27.9	PASS
SG-260	9th Lift Subgrade	183610	1267915	N/A	CS-7	114.2	90.0	92.8	97.0	95.0	26.9	27.9	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/20/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 6:00 PM
Arrive Site: 7:30 AM Arrive Lab: 7:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
CS-3	Red-Brown Lean Clay	107.0	17.7
CS-6	Red-Brown Fat Clay	94.7	25.2
CS-7	Dark Brown Fat Clay	92.8	27.9

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-261	9th Lift Subgrade	183720	1267930	N/A	CS-1	124.5	102.0	106.9	95.4	95.0	22.1	16.4	PASS
SG-262	9th Lift Subgrade	183810	1267950	N/A	CS-7	117.6	93.5	92.8	100.7	95.0	25.8	27.9	PASS
SG-263	9th Lift Subgrade	183510	1268005	N/A	CS-3	126.3	106.1	107.0	99.2	95.0	19.0	17.7	PASS
SG-264	9th Lift Subgrade	183600	1268015	N/A	CS-7	117.3	89.3	92.8	96.3	95.0	31.3	27.9	PASS
SG-265	9th Lift Subgrade	183700	1268030	N/A	CS-1	124.0	104.6	106.9	97.9	95.0	18.5	16.4	PASS
SG-266	9th Lift Subgrade	183790	1268050	N/A	CS-6	120.4	94.9	94.7	100.2	95.0	26.9	25.2	PASS
SG-267	9th Lift Subgrade	183500	1268100	N/A	CS-3	126.4	105.2	107.0	98.3	95.0	20.2	17.7	PASS
SG-268	9th Lift Subgrade	183580	1268110	N/A	CS-3	124.4	103.3	107.0	96.6	95.0	20.4	17.7	PASS
SG-269	9th Lift Subgrade	183675	1268125	N/A	CS-1	124.7	103.1	106.9	96.5	95.0	20.9	16.4	PASS
SG-270	9th Lift Subgrade	183770	1268160	N/A	CS-7	112.8	88.2	92.8	95.0	95.0	28.0	27.9	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/25/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 6:30 AM Depart Site: 6:00 PM
Arrive Site: 7:30 AM Arrive Lab: 7:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-276	10th Lift Subgrade	183550	1267720	N/A	PR-6	119.7	95.7	94.8	100.9	95.0	25.1	24.6	PASS
SG-277	10th Lift Subgrade	183650	1267730	N/A	PR-6	116.2	91.6	94.8	96.7	95.0	26.8	24.6	PASS
SG-278	10th Lift Subgrade	183750	1267740	N/A	PR-6	117.5	95.5	94.8	100.8	95.0	23.0	24.6	PASS
SG-279	10th Lift Subgrade	183850	1267750	N/A	PR-2	115.1	88.5	92.4	95.7	95.0	30.1	27.5	PASS
SG-280	10th Lift Subgrade	183540	1267810	N/A	PR-6	116.0	94.5	94.8	99.7	95.0	22.7	24.6	PASS
SG-281	10th Lift Subgrade	183640	1267820	N/A	PR-2	112.8	90.2	92.4	97.7	95.0	25.0	27.5	PASS
SG-282	10th Lift Subgrade	183740	1267830	N/A	PR-6	121.6	96.1	94.8	101.4	95.0	26.5	24.6	PASS
SG-283	10th Lift Subgrade	183840	1267540	N/A	PR-6	115.6	91.9	94.8	96.9	95.0	25.8	24.6	PASS
SG-284	10th Lift Subgrade	183520	1267905	N/A	PR-6	122.4	97.5	94.8	102.8	95.0	25.6	24.6	PASS
SG-285	10th Lift Subgrade	183610	1267915	N/A	PR-6	119.7	95.5	94.8	100.8	95.0	25.3	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 7/25/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Subgrade

Depart Lab: 5:30 AM Depart Site: 6:00 PM
Arrive Site: 6:30 AM Arrive Lab: 7:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
SG-286	10th Lift Subgrade	183720	1267930	N/A	PR-6	114.2	92.0	94.8	97.1	95.0	24.1	24.6	PASS
SG-287	10th Lift Subgrade	183810	1267950	N/A	PR-2	116.7	91.5	92.4	99.0	95.0	27.6	27.5	PASS
SG-288	10th Lift Subgrade	183510	1268005	N/A	PR-6	121.5	97.0	94.8	102.3	95.0	25.3	24.6	PASS
SG-289	10th Lift Subgrade	183600	1268015	N/A	PR-6	119.0	95.2	94.8	100.4	95.0	25.0	24.6	PASS
SG-290	10th Lift Subgrade	183700	1268030	N/A	PR-6	121.0	96.0	94.8	101.3	95.0	26.0	24.6	PASS
SG-291	10th Lift Subgrade	183790	1268050	N/A	PR-2	116.7	91.7	92.4	99.3	95.0	27.2	27.5	PASS
SG-292	10th Lift Subgrade	183500	1268100	N/A	PR-6	117.3	92.9	94.8	98.0	95.0	26.2	24.6	PASS
SG-293	10th Lift Subgrade	183580	1268110	N/A	PR-6	117.4	95.4	94.8	100.6	95.0	23.1	24.6	PASS
SG-294	10th Lift Subgrade	183675	1268125	N/A	PR-2	115.5	92.2	92.4	99.8	95.0	25.3	27.5	PASS
SG-295	10th Lift Subgrade	183770	1268160	N/A	PR-2	115.6	91.9	92.4	99.5	95.0	25.8	27.5	PASS

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Bryant, AR 72022
(501) 847-9292

Depart Lab:	<u>5:30 AM</u>	Depart Site:	<u>6:00 PM</u>
Arrive Site:	<u>6:30 AM</u>	Arrive Lab:	<u>7:00 PM</u>

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

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Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Project No: 35097116
Date of Report: 8/7/2009

25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Depart Lab:	<u>6:30 AM</u>	Depart Site:	<u>6:00 PM</u>
Arrive Site:	<u>7:30 AM</u>	Arrive Lab:	<u>7:00 PM</u>

[illegible]

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/9/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-1	1st Lift Clay Liner	183550	1267720	P-5	PR-6	117.4	90.7	94.8	95.7	95.0	29.4	24.6	PASS
CL-2	1st Lift Clay Liner	183650	1267730	N/A	PR-6	115.8	90.6	94.8	95.6	95.0	27.8	24.6	PASS
CL-3	1st Lift Clay Liner	183750	1267740	N/A	PR-6	117.8	90.8	94.8	95.8	95.0	29.7	24.6	PASS
CL-4	1st Lift Clay Liner	183850	1267750	P-6	PR-6	117.3	91.5	94.8	96.5	95.0	28.2	24.6	PASS
CL-5	1st Lift Clay Liner	183540	1267810	N/A	PR-6	117.2	93.0	94.8	98.1	95.0	26.0	24.6	PASS
CL-6	1st Lift Clay Liner	183640	1267820	P-7	PR-6	118.0	91.5	94.8	96.5	95.0	29.0	24.6	PASS
CL-7	1st Lift Clay Liner	183740	1267830	N/A	PR-6	116.4	92.1	94.8	97.1	95.0	26.4	24.6	PASS
CL-8	1st Lift Clay Liner	183840	1267540	N/A	PR-6	116.7	91.5	94.8	96.6	95.0	27.5	24.6	PASS
CL-9	1st Lift Clay Liner	183520	1267905	N/A	PR-6	120.8	92.6	94.8	97.7	95.0	30.4	24.6	PASS
CL-10	1st Lift Clay Liner	183610	1267915	N/A	PR-6	119.9	92.5	94.8	97.6	95.0	29.6	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/9/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-11	1st Lift Clay Liner	183720	1267930	P-8	PR-6	118.1	92.3	94.8	97.3	95.0	28.0	24.6	PASS
CL-12	1st Lift Clay Liner	183810	1267950	N/A	PR-6	116.4	91.2	94.8	96.2	95.0	27.7	24.6	PASS
CL-13	1st Lift Clay Liner	183510	1268005	N/A	PR-6	122.6	92.2	94.8	97.2	95.0	33.0	24.6	PASS
CL-14	1st Lift Clay Liner	183600	1268015	N/A	PR-6	119.9	94.9	94.8	100.1	95.0	26.4	24.6	PASS
CL-15	1st Lift Clay Liner	183700	1268030	N/A	PR-6	115.1	90.2	94.8	95.2	95.0	27.6	24.6	PASS
CL-16	1st Lift Clay Liner	183790	1268050	P-9	PR-6	118.0	92.0	94.8	97.1	95.0	28.2	24.6	PASS
CL-17	1st Lift Clay Liner	183500	1268100	P-10	PR-6	119.0	92.3	94.8	97.4	95.0	28.9	24.6	PASS
CL-18	1st Lift Clay Liner	183580	1268110	N/A	PR-6	120.0	94.5	94.8	99.7	95.0	27.0	24.6	PASS
CL-19	1st Lift Clay Liner	183675	1268125	N/A	PR-6	120.0	94.5	94.8	99.7	95.0	27.0	24.6	PASS
CL-20	1st Lift Clay Liner	183770	1268160	N/A	PR-6	117.9	93.1	94.8	98.2	95.0	26.7	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-21	1st Lift Clay Liner	183475	1268200	N/A	PR-6	122.1	96.1	94.8	101.4	95.0	27.0	24.6	PASS
CL-22	1st Lift Clay Liner	183570	1268220	P-11	PR-6	121.9	95.6	94.8	100.9	95.0	27.5	24.6	PASS
CL-23	1st Lift Clay Liner	183670	1268235	N/A	PR-6	120.8	95.8	94.8	101.1	95.0	26.1	24.6	PASS
CL-24	1st Lift Clay Liner	183765	1268250	N/A	PR-2	116.1	89.5	92.4	96.9	95.0	29.7	27.5	PASS
CL-25	1st Lift Clay Liner	183550	1268310	N/A	PR-2	117.7	90.5	92.4	98.0	95.0	30.0	27.5	PASS
CL-26	1st Lift Clay Liner	183645	1268330	N/A	PR-6	115.9	91.3	94.8	96.3	95.0	27.0	24.6	PASS
CL-27	1st Lift Clay Liner	183740	1268350	P-12	PR-6	118.1	91.1	94.8	96.1	95.0	29.6	24.6	PASS
CL-28	1st Lift Clay Liner	183650	1268430	N/A	PR-2	116.0	89.8	92.4	97.2	95.0	29.2	27.5	PASS
CL-29	1st Lift Clay Liner	183725	1268450	P-13	PR-6	120.0	94.0	94.8	99.2	95.0	27.6	24.6	PASS
CL-30	1st Lift Clay Liner	183730	1268530	N/A	PR-6	118.7	92.3	94.8	97.4	95.0	28.6	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-31	2nd Left Clay Liner	183550	1267720	N/A	PR-6	115.8	91.3	94.8	96.3	95.0	26.9	24.6	PASS
CL-32	2nd Left Clay Liner	183650	1267730	P-14	PR-6	120.5	93.5	94.8	98.6	95.0	28.9	24.6	PASS
CL-33	2nd Left Clay Liner	183750	1267740	N/A	PR-6	118.2	91.3	94.8	96.3	95.0	29.5	24.6	PASS
CL-34	2nd Left Clay Liner	183850	1267750	N/A	PR-6	116.6	91.1	94.8	96.1	95.0	28.0	24.6	PASS
CL-35	2nd Left Clay Liner	183540	1267810	N/A	PR-6	117.9	93.5	94.8	98.6	95.0	26.1	24.6	PASS
CL-36	2nd Left Clay Liner	183640	1267820	N/A	PR-6	119.2	94.4	94.8	99.6	95.0	26.3	24.6	PASS
CL-37	2nd Left Clay Liner	183740	1267830	P-15	PR-6	118.5	91.1	94.8	96.1	95.0	30.1	24.6	PASS
CL-38	2nd Left Clay Liner	183840	1267540	N/A	PR-6	118.2	90.5	94.8	95.5	95.0	30.6	24.6	PASS
CL-39	2nd Left Clay Liner	183520	1267905	N/A	PR-6	120.0	92.1	94.8	97.1	95.0	30.3	24.6	PASS
CL-40	2nd Left Clay Liner	183610	1267915	N/A	PR-6	118.1	90.5	94.8	95.5	95.0	30.5	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-41	2nd Left Clay Liner	183720	1267930	N/A	PR-2	116.8	89.9	92.4	97.3	95.0	29.9	27.5	PASS
CL-42	2nd Left Clay Liner	183810	1267950	P-16	PR-6	119.1	93.7	94.8	98.8	95.0	27.1	24.6	PASS
CL-43	2nd Left Clay Liner	183510	1268005	P-17	PR-6	118.6	90.2	94.8	95.1	95.0	31.5	24.6	PASS
CL-44	2nd Left Clay Liner	183600	1268015	N/A	PR-2	115.6	89.6	92.4	97.0	95.0	29.0	27.5	PASS
CL-45	2nd Left Clay Liner	183700	1268030	N/A	PR-6	118.8	91.2	94.8	96.2	95.0	30.3	24.6	PASS
CL-46	2nd Left Clay Liner	183790	1268050	N/A	PR-6	122.4	94.4	94.8	99.6	95.0	29.6	24.6	PASS
CL-47	2nd Left Clay Liner	183500	1268100	N/A	PR-6	119.9	93.2	94.8	98.3	95.0	28.6	24.6	PASS
CL-48	2nd Left Clay Liner	183580	1268110	P-18	PR-6	122.0	95.3	94.8	100.5	95.0	28.0	24.6	PASS
CL-49	2nd Left Clay Liner	183675	1268125	N/A	PR-6	118.4	91.6	94.8	96.6	95.0	29.3	24.6	PASS
CL-50	2nd Left Clay Liner	183770	1268160	N/A	PR-6	121.4	92.1	94.8	97.2	95.0	31.8	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/10/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
CS-1	Brown Lean Clay	106.9	16.4
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-51	2nd Left Clay Liner	183475	1268200	N/A	PR-6	114.6	91.2	94.8	96.2	95.0	25.6	24.6	PASS
CL-52	2nd Left Clay Liner	183570	1268220	N/A	PR-6	118.5	90.3	94.8	95.3	95.0	31.2	24.6	PASS
CL-53	2nd Left Clay Liner	183670	1268235	P-19	PR-6	121.1	93.8	94.8	98.9	95.0	29.1	24.6	PASS
CL-54	2nd Left Clay Liner	183765	1268250	N/A	CS-1	123.9	102.8	106.9	96.2	95.0	20.5	16.4	PASS
CL-55	2nd Left Clay Liner	183550	1268310	P-20	PR-6	118.0	91.7	94.8	96.7	95.0	28.7	24.6	PASS
CL-56	2nd Left Clay Liner	183645	1268330	N/A	PR-6	120.8	94.7	94.8	99.9	95.0	27.5	24.6	PASS
CL-57	2nd Left Clay Liner	183740	1268350	P-21	PR-6	121.9	95.0	94.8	100.2	95.0	28.3	24.6	PASS
CL-58	2nd Left Clay Liner	183650	1268430	N/A	PR-6	122.3	95.5	94.8	100.7	95.0	28.1	24.6	PASS
CL-59	2nd Left Clay Liner	183725	1268450	N/A	PR-6	122.8	97.6	94.8	103.0	95.0	25.8	24.6	PASS
CL-60	2nd Left Clay Liner	183730	1268530	P-22	PR-6	117.6	91.7	94.8	96.8	95.0	28.2	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-61	3rd Lift Clay Liner	183550	1267720	N/A	PR-2	114.6	89.7	92.4	97.0	95.0	27.8	27.5	PASS
CL-62	3rd Lift Clay Liner	183650	1267730	N/A	PR-6	122.9	97.0	94.8	102.3	95.0	26.7	24.6	PASS
CL-63	3rd Lift Clay Liner	183750	1267740	P-23	PR-6	116.8	91.0	94.8	96.0	95.0	28.3	24.6	PASS
CL-64	3rd Lift Clay Liner	183850	1267750	N/A	PR-6	119.2	92.6	94.8	97.7	95.0	28.7	24.6	PASS
CL-65	3rd Lift Clay Liner	183540	1267810	N/A	PR-6	118.0	90.9	94.8	95.9	95.0	29.8	24.6	PASS
CL-66	3rd Lift Clay Liner	183640	1267820	N/A	PR-6	118.7	94.3	94.8	99.5	95.0	25.9	24.6	PASS
CL-67	3rd Lift Clay Liner	183740	1267830	N/A	PR-6	118.1	90.8	94.8	95.8	95.0	30.0	24.6	PASS
CL-68	3rd Lift Clay Liner	183840	1267540	P-24	PR-6	117.1	90.4	94.8	95.4	95.0	29.5	24.6	PASS
CL-69	3rd Lift Clay Liner	183520	1267905	P-25	PR-6	117.2	91.4	94.8	96.4	95.0	28.2	24.6	PASS
CL-70	3rd Lift Clay Liner	183610	1267915	P-26	PR-6	117.4	90.7	94.8	95.6	95.0	29.5	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-71	3rd Lift Clay Liner	183720	1267930	N/A	PR-6	115.9	92.5	94.8	97.6	95.0	25.3	24.6	PASS
CL-72	3rd Lift Clay Liner	183810	1267950	N/A	PR-2	118.7	91.9	92.4	99.5	95.0	29.1	27.5	PASS
CL-73	3rd Lift Clay Liner	183510	1268005	N/A	PR-2	119.1	90.0	92.4	97.4	95.0	32.4	27.5	PASS
CL-74	3rd Lift Clay Liner	183600	1268015	P-27	PR-6	117.5	91.5	94.8	96.5	95.0	28.4	24.6	PASS
CL-75	3rd Lift Clay Liner	183700	1268030	N/A	PR-6	119.0	93.5	94.8	98.6	95.0	27.3	24.6	PASS
CL-76	3rd Lift Clay Liner	183790	1268050	N/A	PR-6	119.1	93.7	94.8	98.8	95.0	27.1	24.6	PASS
CL-77	3rd Lift Clay Liner	183500	1268100	N/A	PR-2	115.3	89.7	92.4	97.1	95.0	28.5	27.5	PASS
CL-78	3rd Lift Clay Liner	183580	1268110	N/A	PR-6	119.1	94.1	94.8	99.2	95.0	26.6	24.6	PASS
CL-79	3rd Lift Clay Liner	183675	1268125	P-28	PR-6	119.4	91.2	94.8	96.2	95.0	31.0	24.6	PASS
CL-80	3rd Lift Clay Liner	183770	1268160	N/A	PR-6	120.7	91.6	94.8	96.7	95.0	31.7	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/11/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 5:30 PM
Arrive Site: 7:30 AM Arrive Lab: 6:30 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-81	3rd Lift Clay Liner	183475	1268200	P-29	PR-6	119.6	92.1	94.8	97.1	95.0	29.9	24.6	PASS
CL-82	3rd Lift Clay Liner	183570	1268220	N/A	PR-6	118.6	93.3	94.8	98.4	95.0	27.1	24.6	PASS
CL-83	3rd Lift Clay Liner	183670	1268235	N/A	PR-6	122.0	96.0	94.8	101.3	95.0	27.1	24.6	PASS
CL-84	3rd Lift Clay Liner	183765	1268250	P-30	PR-6	121.7	94.0	94.8	99.1	95.0	29.5	24.6	PASS
CL-85	3rd Lift Clay Liner	183550	1268310	N/A	PR-6	120.0	94.4	94.8	99.6	95.0	27.1	24.6	PASS
CL-86	3rd Lift Clay Liner	183645	1268330	N/A	PR-6	119.5	91.6	94.8	96.6	95.0	30.5	24.6	PASS
CL-87	3rd Lift Clay Liner	183740	1268350	N/A	PR-6	122.2	96.1	94.8	101.4	95.0	27.1	24.6	PASS
CL-88	3rd Lift Clay Liner	183650	1268430	N/A	PR-6	122.4	94.9	94.8	100.1	95.0	29.0	24.6	PASS
CL-89	3rd Lift Clay Liner	183725	1268450	P-31	PR-6	122.4	96.8	94.8	102.1	95.0	26.4	24.6	PASS
CL-90	3rd Lift Clay Liner	183730	1268530	N/A	PR-6	124.7	98.0	94.8	103.3	95.0	27.3	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/12/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-1	Brown Lean Clay	108.4	17.1
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-91	4th Lift Clay Liner	183550	1267720	N/A	PR-6	121.3	95.9	94.8	101.1	95.0	26.5	24.6	PASS
CL-92	4th Lift Clay Liner	183650	1267730	P-37	PR-6	122.0	95.2	94.8	100.4	95.0	28.2	24.6	PASS
CL-93	4th Lift Clay Liner	183750	1267740	N/A	PR-6	119.4	91.2	94.8	96.2	95.0	30.9	24.6	PASS
CL-94	4th Lift Clay Liner	183850	1267750	P-32	PR-6	119.0	92.2	94.8	97.2	95.0	29.1	24.6	PASS
CL-95	4th Lift Clay Liner	183540	1267810	P-39	PR-2	118.6	90.1	92.4	97.5	95.0	31.6	27.5	PASS
CL-96	4th Lift Clay Liner	183640	1267820	N/A	PR-6	121.3	96.1	94.8	101.4	95.0	26.2	24.6	PASS
CL-97	4th Lift Clay Liner	183740	1267830	N/A	PR-1	127.9	104.0	108.4	95.9	95.0	23.0	17.1	PASS
CL-98	4th Lift Clay Liner	183840	1267540	N/A	PR-6	121.5	95.4	94.8	100.6	95.0	27.4	24.6	PASS
CL-99	4th Lift Clay Liner	183520	1267905	N/A	PR-2	119.0	90.1	92.4	97.5	95.0	32.1	27.5	PASS
CL-100	4th Lift Clay Liner	183610	1267915	N/A	PR-6	120.8	94.5	94.8	99.7	95.0	27.8	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/12/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-1	Brown Lean Clay	108.4	17.1
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-101	4th Lift Clay Liner	183720	1267930	P-33	PR-6	124.3	96.1	94.8	101.4	95.0	29.3	24.6	PASS
CL-102	4th Lift Clay Liner	183810	1267950	N/A	PR-6	122.4	97.0	94.8	102.3	95.0	26.2	24.6	PASS
CL-103	4th Lift Clay Liner	183510	1268005	N/A	PR-6	119.6	92.8	94.8	97.9	95.0	28.9	24.6	PASS
CL-104	4th Lift Clay Liner	183600	1268015	P-38	PR-1	129.8	107.4	108.4	99.0	95.0	20.9	17.1	PASS
CL-105	4th Lift Clay Liner	183700	1268030	P-34	PR-6	118.6	92.4	94.8	97.5	95.0	28.3	24.6	PASS
CL-106	4th Lift Clay Liner	183790	1268050	N/A	PR-6	118.3	92.1	94.8	97.1	95.0	28.5	24.6	PASS
CL-107	4th Lift Clay Liner	183500	1268100	N/A	PR-2	117.0	90.3	92.4	97.7	95.0	29.6	27.5	PASS
CL-108	4th Lift Clay Liner	183580	1268110	N/A	PR-2	117.8	90.8	92.4	98.2	95.0	29.8	27.5	PASS
CL-109	4th Lift Clay Liner	183675	1268125	N/A	PR-6	120.7	93.1	94.8	98.2	95.0	29.7	24.6	PASS
CL-110	4th Lift Clay Liner	183770	1268160	P-35	PR-2	116.7	90.8	92.4	98.3	95.0	28.5	27.5	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/13/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-111	4th Lift Clay Liner	183475	1268200	P-40	PR-6	118.3	91.1	94.8	96.1	95.0	29.8	24.6	PASS
CL-112	4th Lift Clay Liner	183570	1268220	N/A	PR-6	122.0	95.2	94.8	100.4	95.0	28.2	24.6	PASS
CL-113	4th Lift Clay Liner	183670	1268235	N/A	PR-6	117.9	92.4	94.8	97.5	95.0	27.6	24.6	PASS
CL-114	4th Lift Clay Liner	183765	1268250	P-36	PR-6	118.8	92.5	94.8	97.5	95.0	28.5	24.6	PASS
CL-115	4th Lift Clay Liner	183550	1268310	N/A	PR-6	120.2	95.8	94.8	101.0	95.0	25.5	24.6	PASS
CL-116	4th Lift Clay Liner	183645	1268330	N/A	PR-6	116.7	92.0	94.8	97.0	95.0	26.9	24.6	PASS
CL-117	4th Lift Clay Liner	183740	1268350	N/A	PR-6	119.3	93.8	94.8	98.9	95.0	27.2	24.6	PASS
CL-118	4th Lift Clay Liner	183650	1268430	N/A	PR-6	116.9	92.2	94.8	97.2	95.0	26.8	24.6	PASS
CL-119	4th Lift Clay Liner	183725	1268450	N/A	PR-6	121.4	94.5	94.8	99.7	95.0	28.5	24.6	PASS
CL-120	4th Lift Clay Liner	183730	1268530	N/A	PR-2	119.0	90.4	92.4	97.9	95.0	31.6	27.5	PASS

Summary of Field Density Test Results ASTM D 2922



Project No: 35097116
Date of Report: 8/13/2009

25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name: Waste Management
Contractor: Grayco
Project Name: Two Pine - Cell 3
Location: North Little Rock, Arkansas
Reviewed by: Brad Fureigh, E.I.
Technician: Joe Smith
Test Location: Cell 3 - Clay Liner

Depart Lab: 6:30 AM Depart Site: 7:00 PM
Arrive Site: 7:30 AM Arrive Lab: 8:00 PM

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-2	Dark Brown Fat Clay	92.4	27.5
PR-6	Brown Fat Clay	94.8	24.6

Test No.	Lift or Elev.	Test Location		Shelby Tube Sample	Mat'l. No.	Wet Density, pcf	Dry Density, pcf	Lab Max. Dry Density, pcf	Percent Compaction %	Percent Compaction Required	Moisture Content %	Optimum Moisture %	PASS or FAIL
		Northing	Easting										
CL-121	1st Lift Clay Liner	183690	1268560	N/A	PR-6	120.2	95.1	94.8	100.3	95.0	26.4	24.6	PASS
CL-122	1st Lift Clay Liner	183550	1268400	P-41	PR-6	120.8	93.1	94.8	98.2	95.0	29.8	24.6	PASS
CL-123	1st Lift Clay Liner	183625	1268475	N/A	PR-6	118.9	92.9	94.8	98.0	95.0	28.0	24.6	PASS
CL-124	2nd Lift Clay Liner	183690	1268560	P-42	PR-2	117.3	90.4	92.4	97.8	95.0	29.8	27.5	PASS
CL-125	2nd Lift Clay Liner	183550	1268400	P-43	PR-2	117.1	90.7	92.4	98.2	95.0	29.1	27.5	PASS
CL-126	2nd Lift Clay Liner	183625	1268475	N/A	PR-6	118.2	92.6	94.8	97.7	95.0	27.6	24.6	PASS
CL-127	3rd Lift Clay Liner	183610	1268460	N/A	PR-6	120.3	95.8	94.8	101.0	95.0	25.6	24.6	PASS
CL-128	3rd Lift Clay Liner	183480	1268340	N/A	PR-2	117.1	90.6	92.4	98.1	95.0	29.2	27.5	PASS
CL-129	3rd Lift Clay Liner	183710	1268560	N/A	PR-6	117.9	92.4	94.8	97.5	95.0	27.6	24.6	PASS
CL-130	4th Lift Clay Liner	183610	1268460	P-44	PR-6	120.9	94.2	94.8	99.4	95.0	28.3	24.6	PASS

Summary of Field Density Test Results ASTM D 2922

Project No: 35097116
Date of Report: 8/13/2009

Terracon
25809 Interstate 30 South
Bryant, AR 72022
(501) 847-9292

Client Name:	Waste Management
Contractor:	Grayco
Project Name:	Two Pine - Cell 3
Location:	North Little Rock, Arkansas
Reviewed by:	Brad Fureigh, E.I.
Technician:	Joe Smith
Test Location:	Cell 3 - Clay Liner

Depart Lab:	<u>6:30 AM</u>	Depart Site:	<u>7:00 PM</u>
Arrive Site:	7:30 AM	Arrive Lab:	8:00 PM

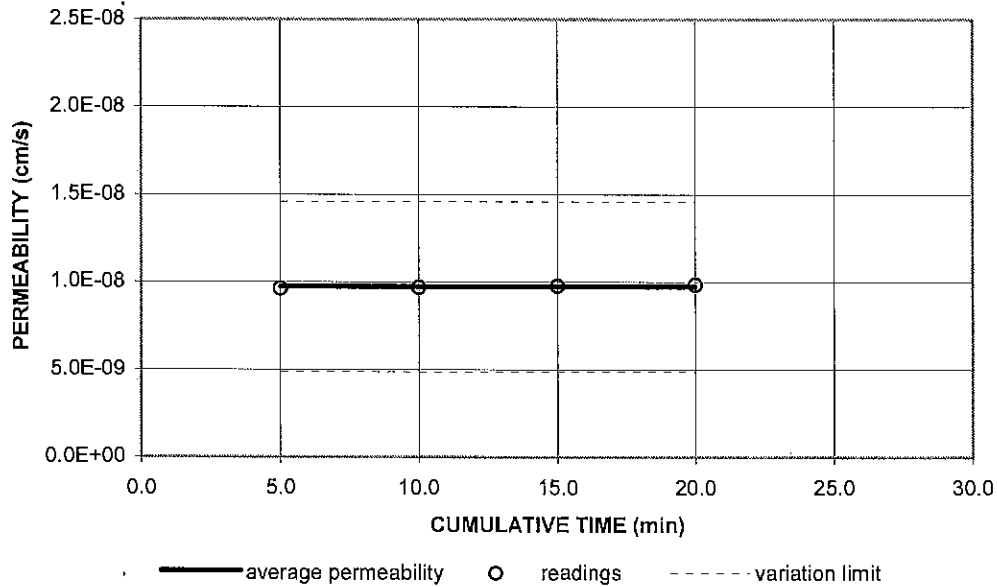
MATERIAL INFORMATION

MATERIAL INFORMATION			
Mat'l. No.	Material Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
PR-6	Brown Fat Clay	94.8	24.6

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APPENDIX F
ENGINEERED BUFFER & COMPACTED CLAY
LINER PERMEABILITY TEST RESULTS

FLEXIBLE WALL PERMEABILITY TEST



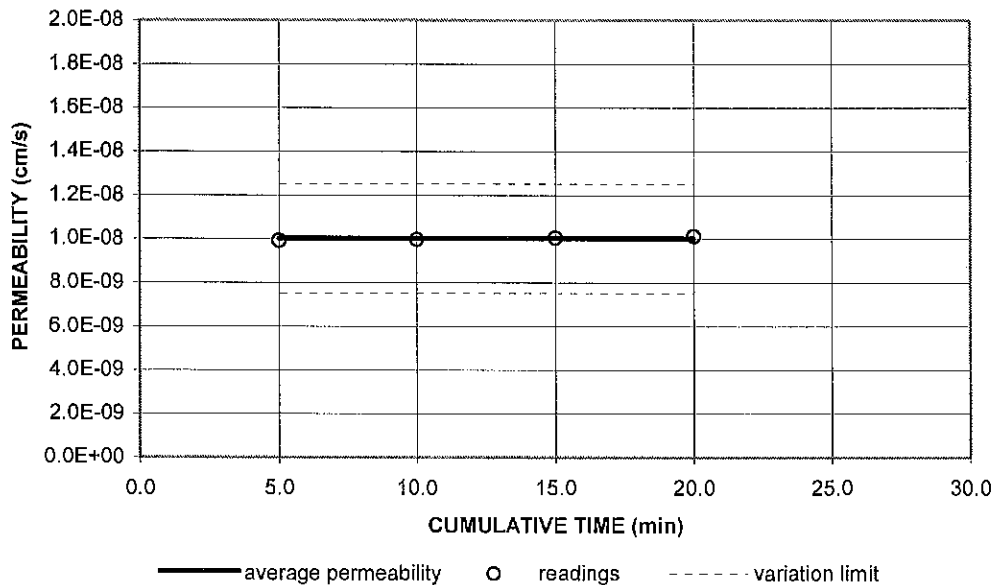
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.93	9.63E-09	9.7E-09
21.00	5.00	10.00	13.83	9.69E-09	
21.00	5.00	15.00	13.73	9.76E-09	
21.00	5.00	20.00	13.63	9.84E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.79	2.80
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		31.32	33.62
% Recompt.		Percent Saturation (%)		99.51	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.61	121.53
Backpressure	90.00	Dry Mass Density (pcf)		91.08	90.95
Cell pressure	100.00	Void Ratio		0.85	0.91
Eff. Stress	10.00	Calculated Porosity, %		45.94	47.58

USCS		LL		PI	
Permeant Used:		WATER		Remarks	
				REDDISH BROWN FAT CLAY	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by	
Client		WM		FCE	
Sample Number		S-55523		Reviewed by	
Sample Location		PERM-1		TGG	
Date		7/29/2009		Lab No.	
		5552			
FLEXIBLE WALL PERMEABILITY TEST					
Terracon					

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.57	9.91E-09	1.0E-08
21.00	5.00	10.00	13.48	9.98E-09	
21.00	5.00	15.00	13.38	1.01E-08	
21.00	5.00	20.00	13.29	1.01E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.91	2.88
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		35.78	36.48
% Recompt.		Percent Saturation (%)		94.63	98.29
Test Pressures (psi)		Wet Mass Density (pcf)		113.21	114.86
Backpressure	90.00	Dry Mass Density (pcf)		83.38	84.16
Cell pressure	100.00	Void Ratio		1.02	1.00
Eff. Stress	10.00	Calculated Porosity, %		50.51	50.05

USCS		LL		PI	
Permeant Used: WATER		Remarks		REDDISH BROWN FAT CLAY	

Project Name WM TWO PINE-CELL 3 CQA		Tested by FCE		Reviewed by TGG	
Client WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST 			
Sample Number S-5731					
Sample Location PERM-2					
Date 8/12/2009	Lab No. 5731				

FLEXIBLE WALL PERMEABILITY TEST

The graph displays the permeability of a flexible wall over time. The y-axis represents Permeability in cm/s, ranging from 0.0E+00 to 2.5E-08. The x-axis represents Cumulative Time in minutes, ranging from 0.0 to 30.0. A solid line indicates the average permeability, which remains constant at 1.0E-08 cm/s. Open circles represent individual readings at 5, 10, 15, and 20 minutes. Dashed lines show the variation limit, which is approximately ±0.25E-08 cm/s around the average.

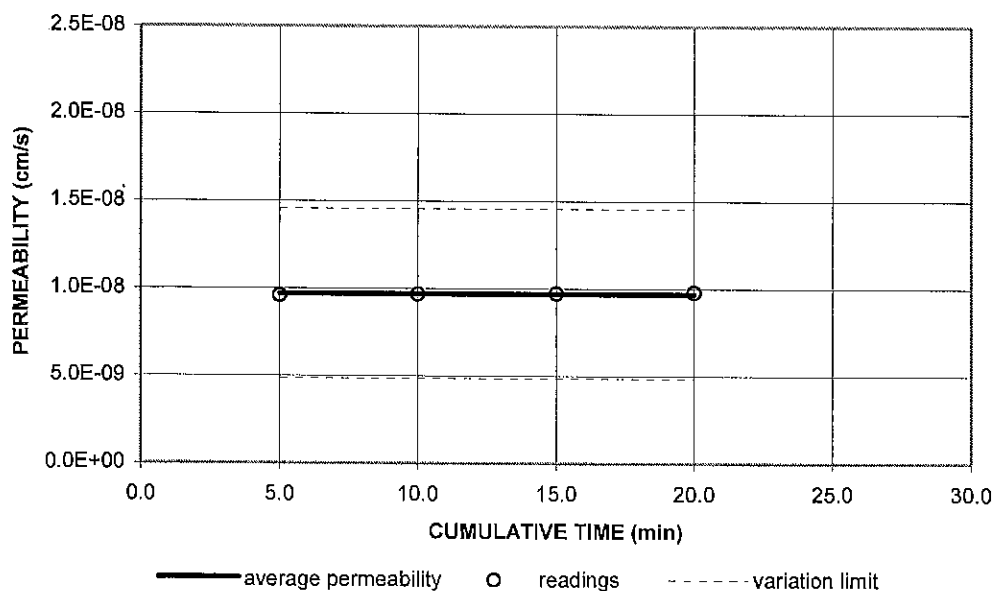
Cumulative Time (min)	Average Permeability (cm/s)	Readings (cm/s)	Variation Limit (cm/s)
5.0	1.0E-08	1.0E-08	±0.25E-08
10.0	1.0E-08	1.0E-08	±0.25E-08
15.0	1.0E-08	1.0E-08	±0.25E-08
20.0	1.0E-08	1.0E-08	±0.25E-08

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.25	1.02E-08	1.0E-08
21.00	5.00	10.00	13.16	1.02E-08	
21.00	5.00	15.00	13.07	1.03E-08	
21.00	5.00	20.00	12.98	1.04E-08	

USCS	LL	PI
Permeant Used: WATER	Remarks	REDDISH BROWN FAT CLAY

FLEXIBLE WALL PERMEABILITY TEST
Terracon

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

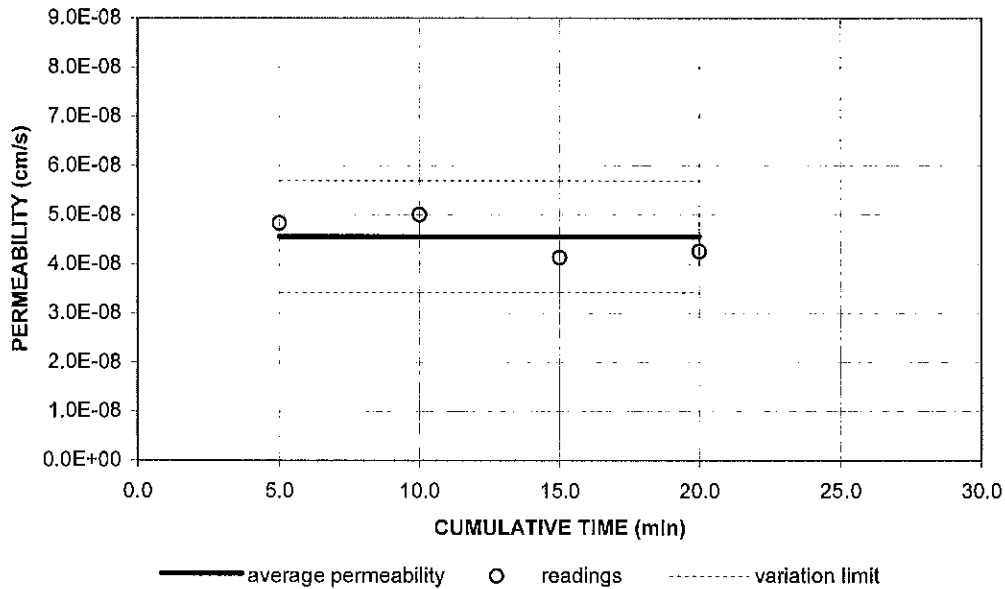
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.13	9.60E-09	9.7E-09
21.00	5.00	10.00	14.04	9.67E-09	
21.00	5.00	15.00	13.94	9.73E-09	
21.00	5.00	20.00	13.84	9.80E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.89	2.90
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		30.28	35.17
% Recompt.		Percent Saturation (%)		91.23	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		115.76	119.62
Backpressure	90.00	Dry Mass Density (pcf)		88.86	88.49
Cell pressure	100.00	Void Ratio		0.90	0.95
Eff. Stress	10.00	Calculated Porosity, %		47.26	48.71

USCS		LL	PI	
Permeant Used:		WATER	Remarks	REDDISH BROWN FAT CLAY
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5733			
Sample Location	PERM-4			
Date	8/12/2009	Lab No.	5733	

8/12/2009

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

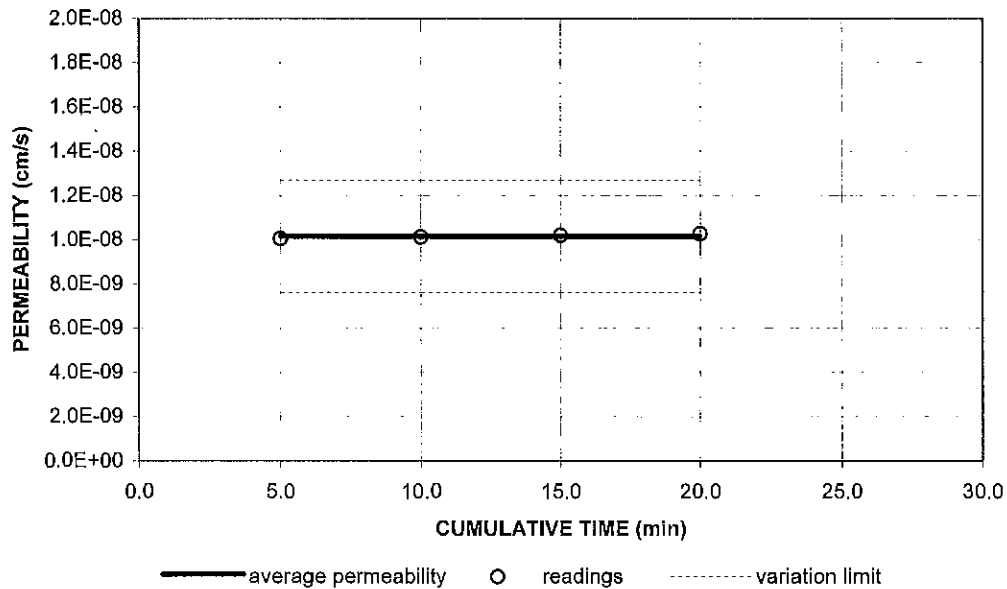
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.84	4.83E-08	4.6E-08
21.00	5.00	10.00	13.36	5.00E-08	
21.00	5.00	15.00	12.97	4.13E-08	
21.00	5.00	20.00	12.59	4.26E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.87	2.88
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		31.65	63.40
% Recompct.		Percent Saturation (%)		68.36	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		98.58	121.80
Backpressure	90.00	Dry Mass Density (pcf)		74.88	74.54
Cell pressure	100.00	Void Ratio		1.25	1.71
Eff. Stress	10.00	Calculated Porosity, %		55.56	63.12

USCS		LL	PI
Permeant Used: WATER		Remarks	REDDISH BROWN FAT CLAY
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5818		
Sample Location	P-5		
Date	8/12/2009 Lab No. 5818		

8/13/2009

FLEXIBLE WALL PERMEABILITY TEST



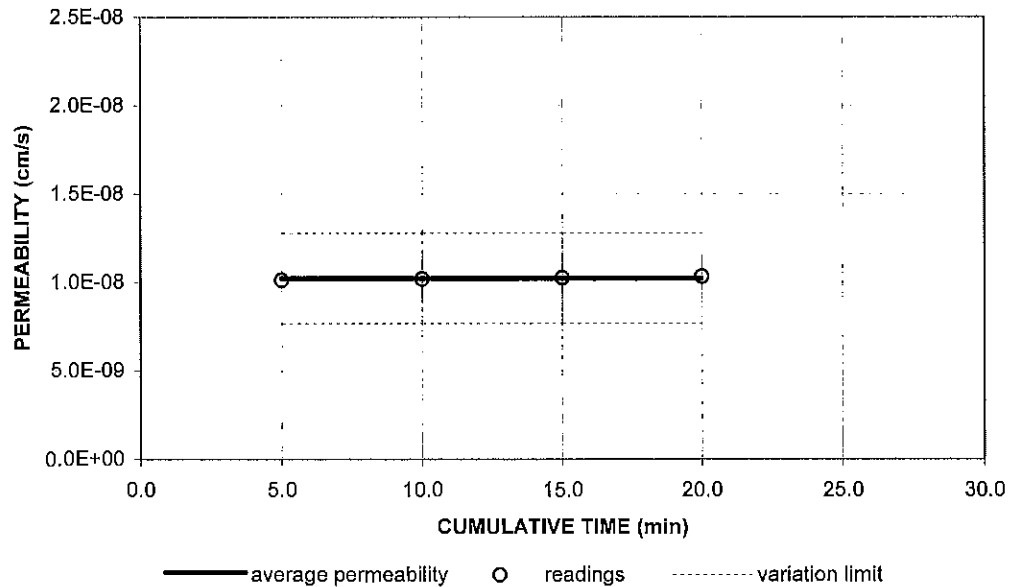
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.45	1.01E-08	1.0E-08
21.00	5.00	10.00	13.36	1.01E-08	
21.00	5.00	15.00	13.27	1.02E-08	
21.00	5.00	20.00	13.17	1.03E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		3.00	2.99
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		28.78	30.29
% Recompct.		Percent Saturation (%)		96.33	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		120.09	121.70
Backpressure	90.00	Dry Mass Density (pcf)		93.25	93.41
Cell pressure	100.00	Void Ratio		0.81	0.82
Eff. Stress	10.00	Calculated Porosity, %		44.65	44.99

USCS		LL	PI
Permeant Used: WATER		Remarks	REDDISH BROWN FAT CLAY
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5819		
Sample Location	P-6		
Date	8/13/2009 Lab No. 5819		

FLEXIBLE WALL PERMEABILITY TEST



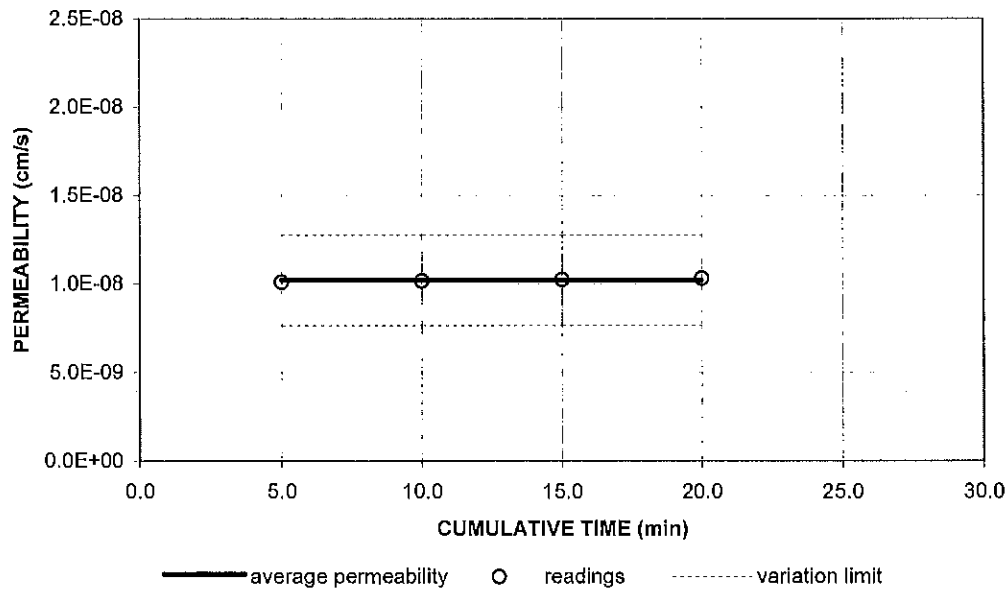
Test Specification: **ASTM D 5084**

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.49	1.01E-08	1.0E-08
21.00	5.00	10.00	13.40	1.02E-08	
21.00	5.00	15.00	13.30	1.03E-08	
21.00	5.00	20.00	13.21	1.03E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.97	2.97
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		31.42	32.83
% Recompct.		Percent Saturation (%)		100.03	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.81	121.01
Backpressure	90.00	Dry Mass Density (pcf)		91.17	91.11
Cell pressure	100.00	Void Ratio		0.85	0.89
Eff. Stress	10.00	Calculated Porosity, %		45.89	46.99

USCS		LL	PI	
Permeant Used:		WATER	Remarks	REDDISH BROWN FAT CLAY
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5820			
Sample Location	P-7			
Date	8/13/2009	Lab No.	5820	

FLEXIBLE WALL PERMEABILITY TEST



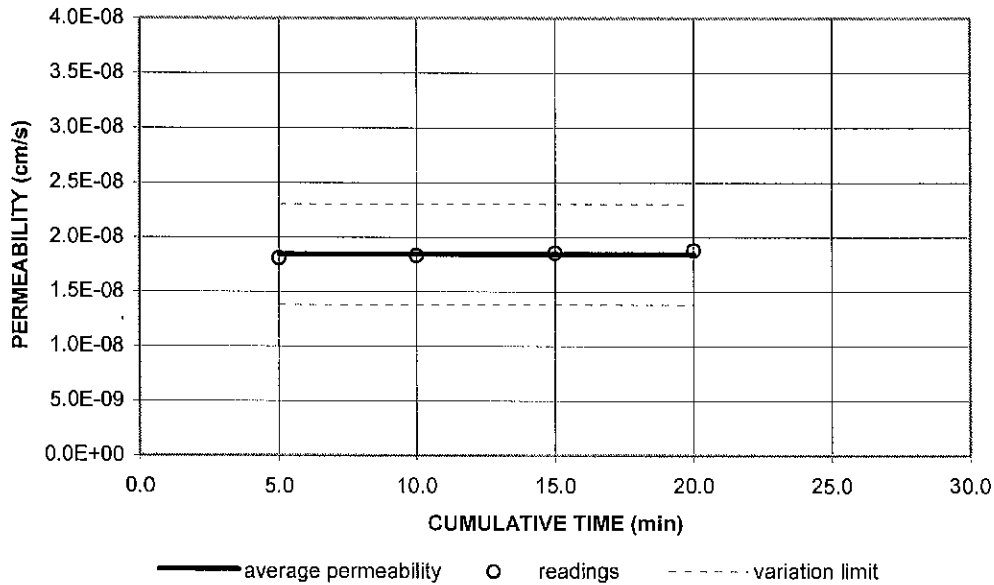
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.42	1.01E-08	1.0E-08
21.00	5.00	10.00	13.32	1.02E-08	
21.00	5.00	15.00	13.23	1.02E-08	
21.00	5.00	20.00	13.13	1.03E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.92	2.91
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		32.19	33.17
% Recompt.		Percent Saturation (%)		99.28	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		118.75	120.12
Backpressure	90.00	Dry Mass Density (pcf)		89.83	90.20
Cell pressure	100.00	Void Ratio		0.88	0.90
Eff. Stress	10.00	Calculated Porosity, %		46.68	47.24

USCS		LL	PI				
Permeant Used:		WATER	Remarks	REDDISH BROWN FAT CLAY			
Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number	S-5821						
Sample Location	P-8						
Date	8/13/2009	Lab No.	5821				

FLEXIBLE WALL PERMEABILITY TEST



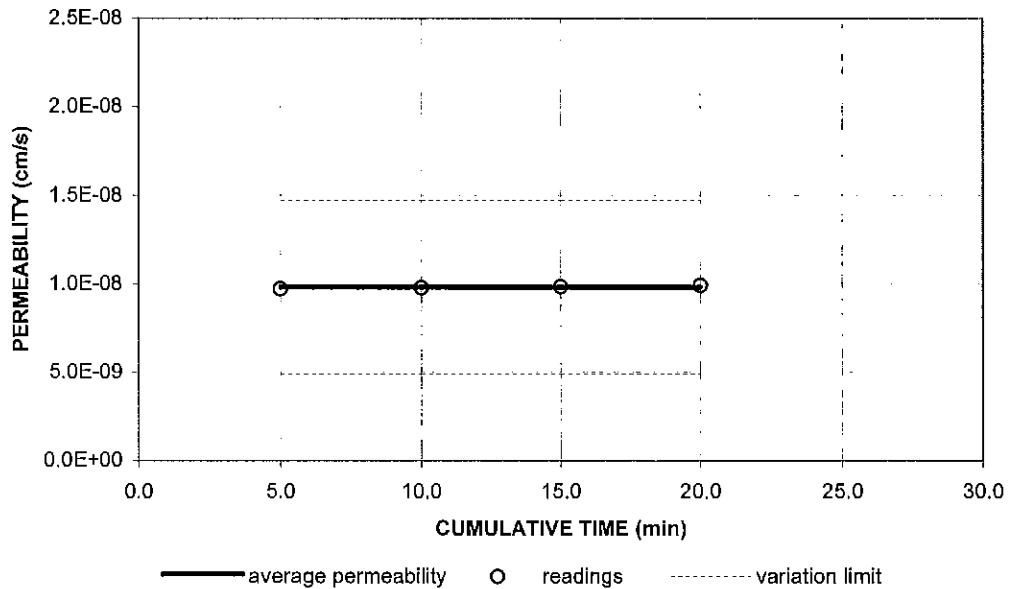
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.97	1.81E-08	1.8E-08
21.00	5.00	10.00	14.78	1.83E-08	
21.00	5.00	15.00	14.59	1.85E-08	
21.00	5.00	20.00	14.40	1.88E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.90	2.89
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		33.98	34.91
% Recompt.		Percent Saturation (%)		101.53	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		118.58	119.73
Backpressure	90.00	Dry Mass Density (pcf)		88.50	88.75
Cell pressure	100.00	Void Ratio		0.90	0.94
Eff. Stress	10.00	Calculated Porosity, %		47.47	48.52

USCS		LL	PI
Permeant Used: WATER		Remarks	REDDISH BROWN FAT CLAY
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 
Sample Number	S-5822		
Sample Location	P-9		
Date	8/13/2009	Lab No. 5822	

FLEXIBLE WALL PERMEABILITY TEST



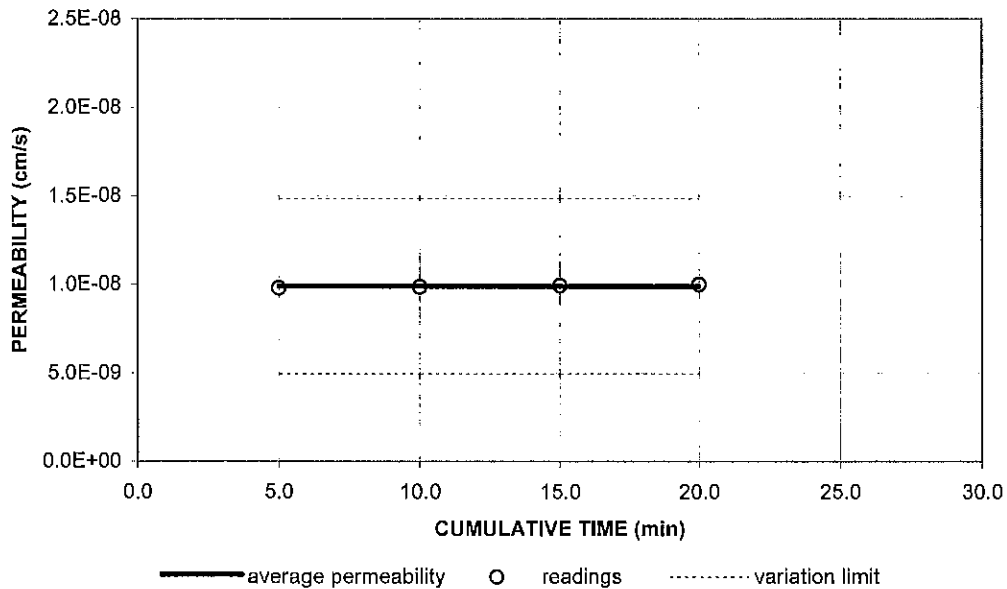
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.04	9.70E-09	9.8E-09
21.00	5.00	10.00	13.94	9.77E-09	
21.00	5.00	15.00	13.84	9.84E-09	
21.00	5.00	20.00	13.75	9.90E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.91	2.90
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		30.67	32.55
% Recompt.		Percent Saturation (%)		97.25	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.85	122.21
Backpressure	90.00	Dry Mass Density (pcf)		91.72	92.20
Cell pressure	100.00	Void Ratio		0.86	0.89
Eff. Stress	10.00	Calculated Porosity, %		46.35	47.15

USCS		LL	PI	
Permeant Used: WATER		Remarks	Reddish Brown Fat clay w/tr rock frags.	
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number	S-5844			
Sample Location	P-10			
Date	8/14/2009	Lab No. 5844		

FLEXIBLE WALL PERMEABILITY TEST



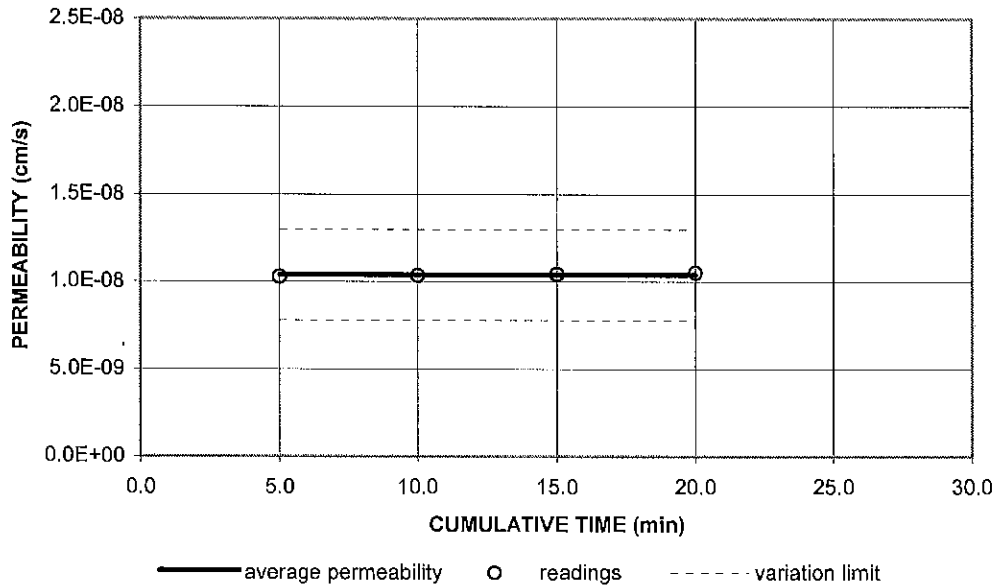
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.96	9.80E-09	9.9E-09
21.00	5.00	10.00	13.87	9.86E-09	
21.00	5.00	15.00	13.78	9.93E-09	
21.00	5.00	20.00	13.68	1.00E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.97	2.97
Opti. M.C., (%)		Specimen Diameter, (inches)	2.82	2.82
Comp. Method		Moisture Content, (%)	27.12	29.26
% Recompt.		Percent Saturation (%)	93.81	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	121.28	122.95
Backpressure	90.00	Dry Mass Density (pcf)	95.40	95.11
Cell pressure	100.00	Void Ratio	0.79	0.80
Eff. Stress	10.00	Calculated Porosity, %	44.20	44.50

USCS		LL	PI
Permeant Used:	WATER	Remarks	Reddish Brown & Br Fat clay
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5845		
Sample Location	P-11		
Date	8/14/2009	Lab No. 5845	

FLEXIBLE WALL PERMEABILITY TEST



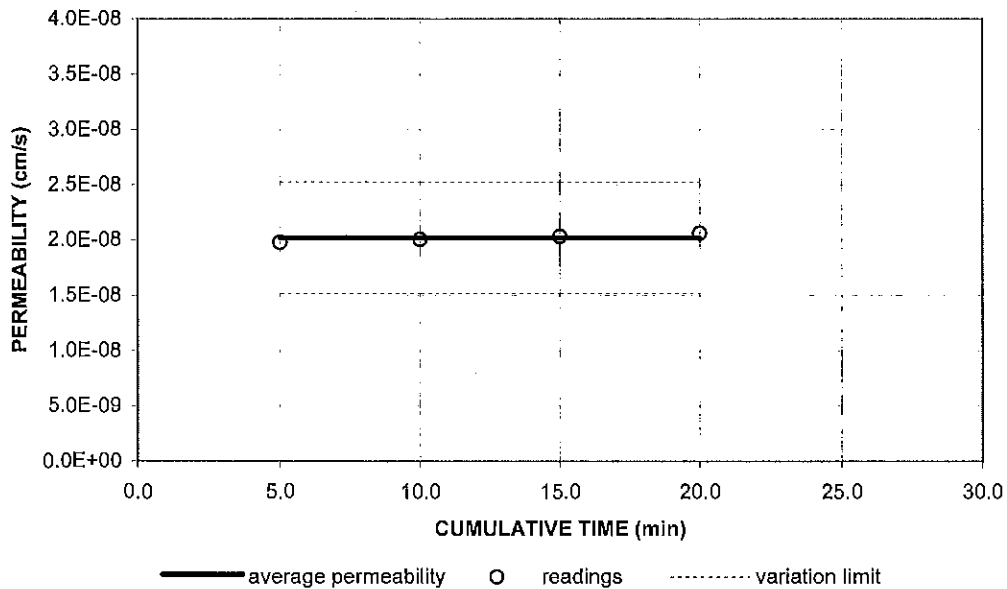
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	12.77	1.03E-08	1.0E-08
21.00	5.00	10.00	12.68	1.04E-08	
21.00	5.00	15.00	12.58	1.04E-08	
21.00	5.00	20.00	12.49	1.05E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.94	2.94
Opti. M.C., (%)		Specimen Diameter, (inches)		2.88	2.83
Comp. Method		Moisture Content, (%)		36.36	37.59
% Recompct.		Percent Saturation (%)		99.20	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		116.54	121.86
Backpressure	90.00	Dry Mass Density (pcf)		85.46	88.57
Cell pressure	100.00	Void Ratio		1.01	1.03
Eff. Stress	10.00	Calculated Porosity, %		50.20	50.83

USCS		LL	PI
Permeant Used: WATER		Remarks	Reddish Brown & Br Fat clay w/tr rock frags
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5846		
Sample Location	P-12		
Date	8/14/2009	Lab No.	5846

FLEXIBLE WALL PERMEABILITY TEST



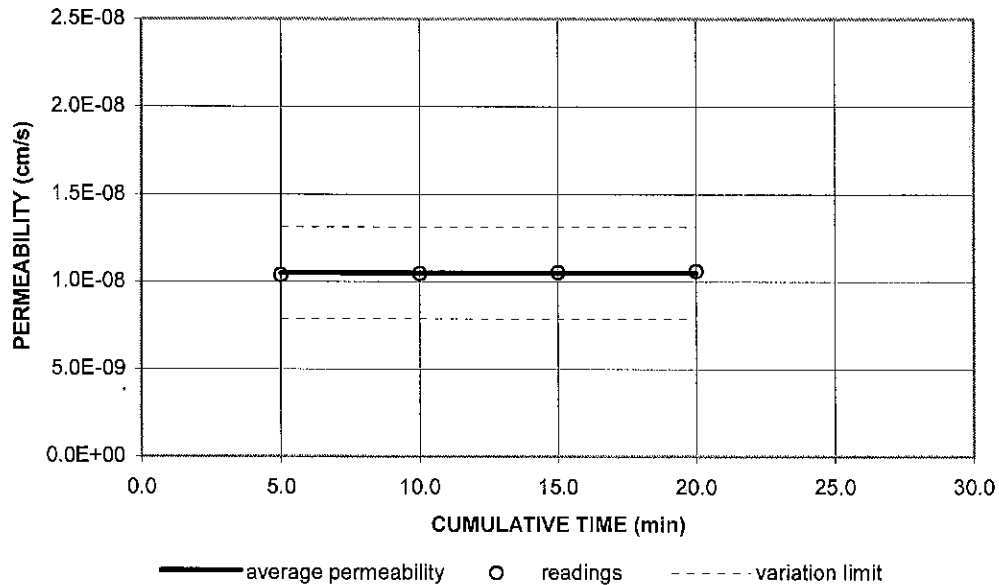
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.68	1.98E-08	2.0E-08
21.00	5.00	10.00	13.49	2.01E-08	
21.00	5.00	15.00	13.31	2.03E-08	
21.00	5.00	20.00	13.12	2.06E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.97	2.97
Optl. M.C., (%)		Specimen Diameter, (inches)	2.83	2.83
Comp. Method		Moisture Content, (%)	29.72	31.15
% Recompt.		Percent Saturation (%)	97.34	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	120.76	121.76
Backpressure	90.00	Dry Mass Density (pcf)	93.09	92.84
Cell pressure	100.00	Void Ratio	0.84	0.85
Eff. Stress	10.00	Calculated Porosity, %	45.55	46.05

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Reddish Brown Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5847					
Sample Location	P-13					
Date	8/14/2009	Lab No.	5847			

FLEXIBLE WALL PERMEABILITY TEST



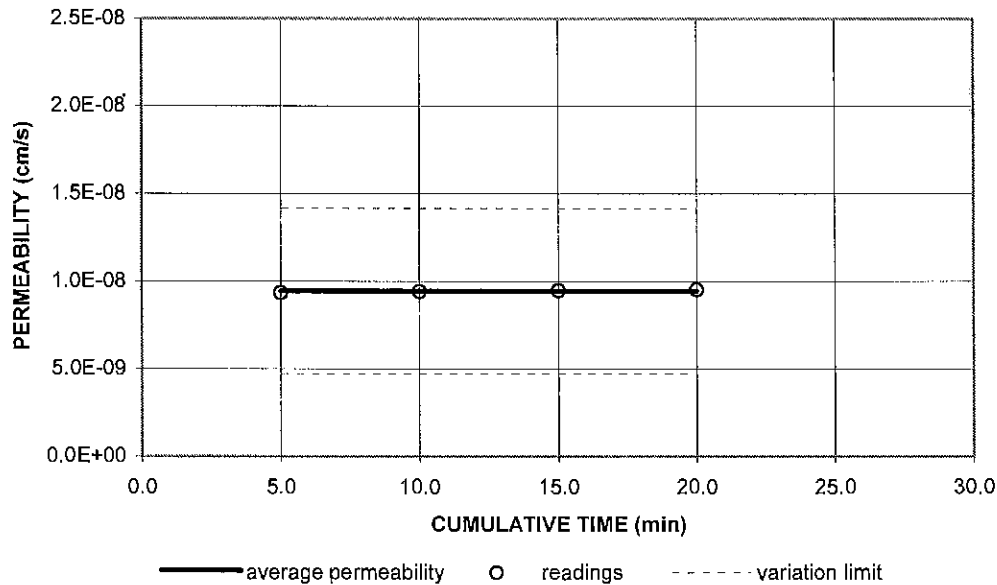
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	12.94	1.04E-08	1.0E-08
21.00	5.00	10.00	12.84	1.05E-08	
21.00	5.00	15.00	12.75	1.05E-08	
21.00	5.00	20.00	12.66	1.06E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.94	2.93
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.84
Comp. Method		Moisture Content, (%)		30.77	31.80
% Recompt.		Percent Saturation (%)		99.79	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		121.43	123.75
Backpressure	90.00	Dry Mass Density (pcf)		92.85	93.89
Cell pressure	100.00	Void Ratio		0.85	0.87
Eff. Stress	10.00	Calculated Porosity, %		45.89	46.65

USCS		LL		PI	
Permeant Used:		WATER		Remarks Brown Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG	
Client		WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number		S-5848			
Sample Location		P-14			
Date		8/14/2009 Lab No. 5848			

FLEXIBLE WALL PERMEABILITY TEST



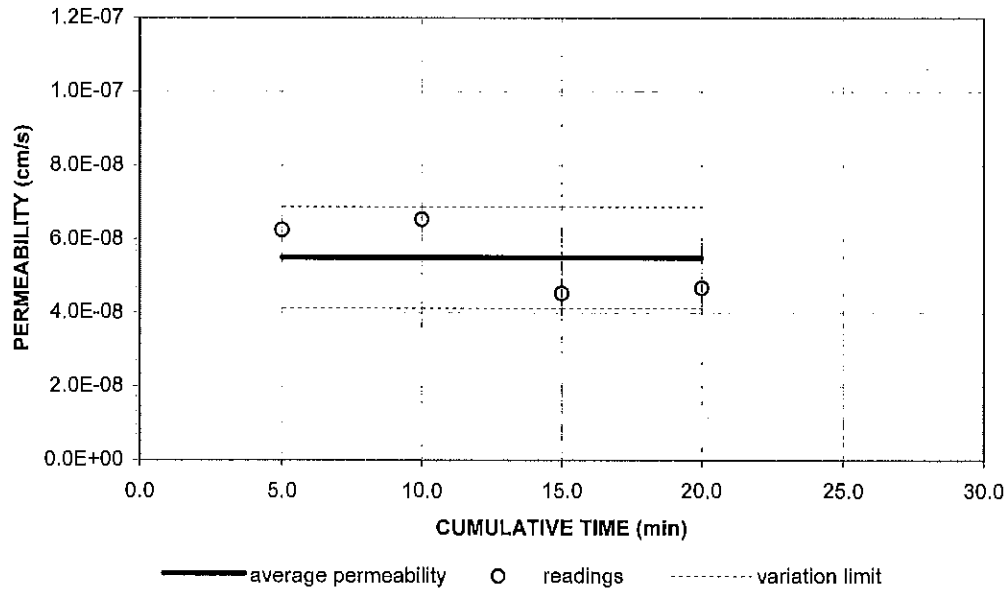
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.60	9.35E-09	9.4E-09
21.00	5.00	10.00	14.50	9.41E-09	
21.00	5.00	15.00	14.41	9.47E-09	
21.00	5.00	20.00	14.31	9.54E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.91	2.92
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		32.07	33.24
% Recompect.		Percent Saturation (%)		96.59	99.90
Test Pressures (psi)		Wet Mass Density (pcf)		118.47	119.39
Backpressure	90.00	Dry Mass Density (pcf)		89.70	89.61
Cell pressure	100.00	Void Ratio		0.91	0.92
Eff. Stress	10.00	Calculated Porosity, %		47.73	47.78

USCS		LL	PI
Permeant Used: WATER		Remarks	Brown Fat clay
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	
Sample Number	S-5849		FLEXIBLE WALL PERMEABILITY TEST 
Sample Location	P-15		
Date	8/14/2009	Lab No. 5849	

FLEXIBLE WALL PERMEABILITY TEST



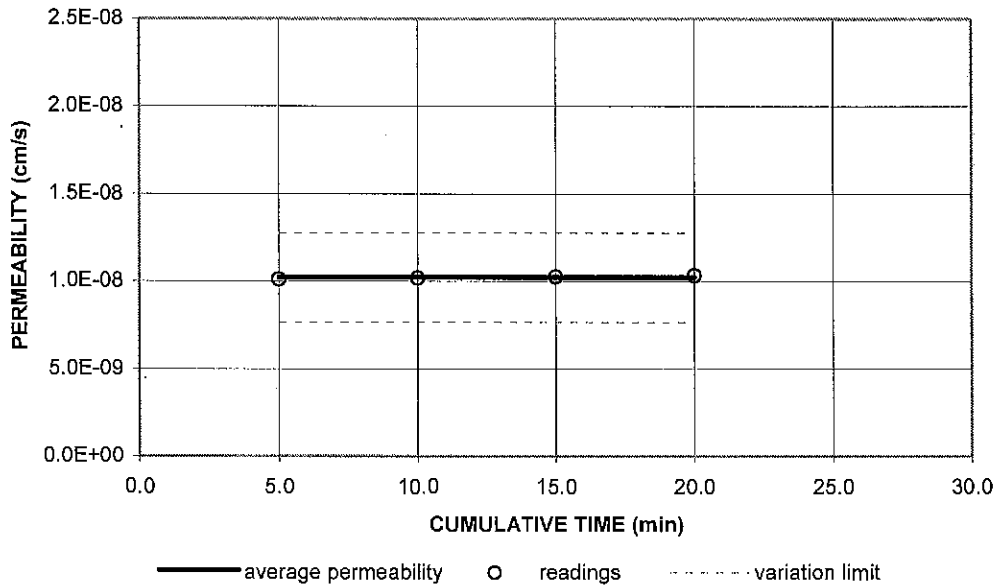
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	12.73	6.25E-08	5.5E-08
21.00	5.00	10.00	12.16	6.53E-08	
21.00	5.00	15.00	11.78	4.53E-08	
21.00	5.00	20.00	11.40	4.68E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.93	2.98
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		28.97	34.22
% Recompect.		Percent Saturation (%)		92.98	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.19	121.66
Backpressure	90.00	Dry Mass Density (pcf)		92.41	90.64
Cell pressure	100.00	Void Ratio		0.86	0.94
Eff. Stress	10.00	Calculated Porosity, %		46.15	48.48

USCS		LL		PI	
Permeant Used:		WATER		Remarks	
				Reddish Br & Br Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by	
Client		WM		FCE	
		W.O.#		Reviewed by	
Sample Number		S-5850		TGG	
Sample Location		P-16		FLEXIBLE WALL PERMEABILITY TEST	
Date		8/17/2009			
		Lab No.		Terracon	
		5850			

FLEXIBLE WALL PERMEABILITY TEST



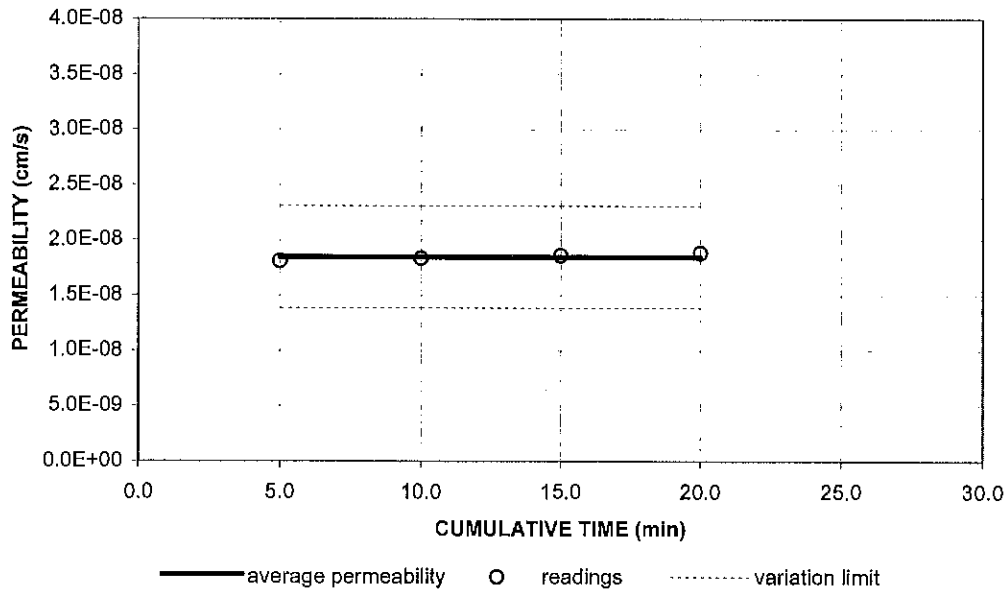
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.32	1.01E-08	1.0E-08
21.00	5.00	10.00	13.22	1.02E-08	
21.00	5.00	15.00	13.13	1.03E-08	
21.00	5.00	20.00	13.03	1.03E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.90	2.91
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		30.37	32.25
% Recompct.		Percent Saturation (%)		90.31	95.35
Test Pressures (psi)		Wet Mass Density (pcf)		116.23	117.58
Backpressure	90.00	Dry Mass Density (pcf)		89.16	88.91
Cell pressure	100.00	Void Ratio		0.92	0.93
Eff. Stress	10.00	Calculated Porosity, %		48.04	48.19

USCS		LL	PI
Permeant Used:	WATER	Remarks	Brown & Gray Fat clay
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5851		
Sample Location	P-17		
Date	8/14/2009	Lab No. 5851	

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: **ASTM D 5084**

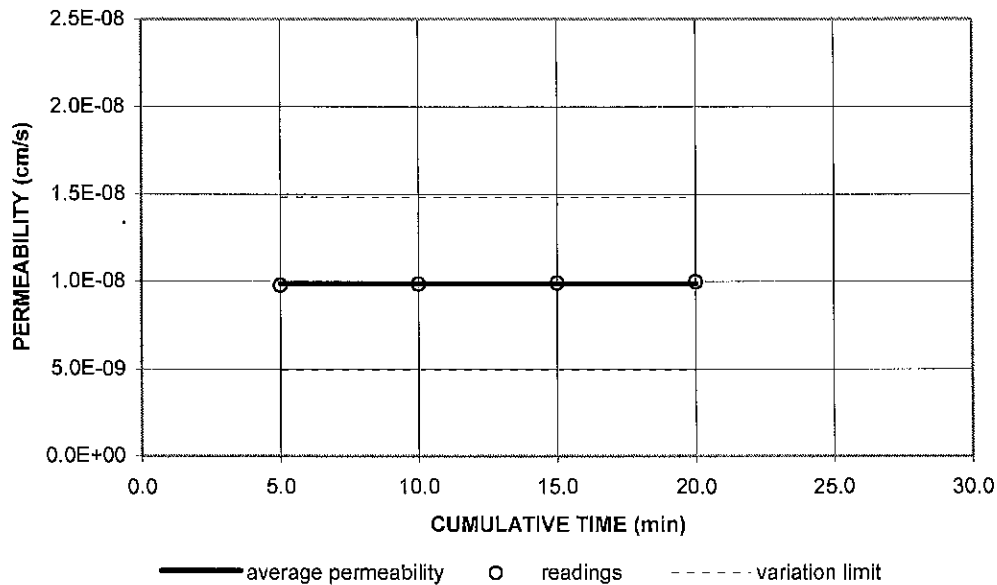
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.87	1.81E-08	1.8E-08
21.00	5.00	10.00	14.68	1.83E-08	
21.00	5.00	15.00	14.49	1.86E-08	
21.00	5.00	20.00	14.29	1.88E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.88	2.89
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		30.28	32.97
% Recompt.		Percent Saturation (%)		93.38	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		118.18	120.04
Backpressure	90.00	Dry Mass Density (pcf)		90.72	90.28
Cell pressure	100.00	Void Ratio		0.89	0.91
Eff. Stress	10.00	Calculated Porosity, %		47.13	47.55

USCS	LL	PI
Permeant Used: WATER	Remarks Brown Fat clay	

Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE	Reviewed by	TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 			
Sample Number	S-5852				
Sample Location	P-18				
Date	8/17/2009	Lab No.	5852		

FLEXIBLE WALL PERMEABILITY TEST



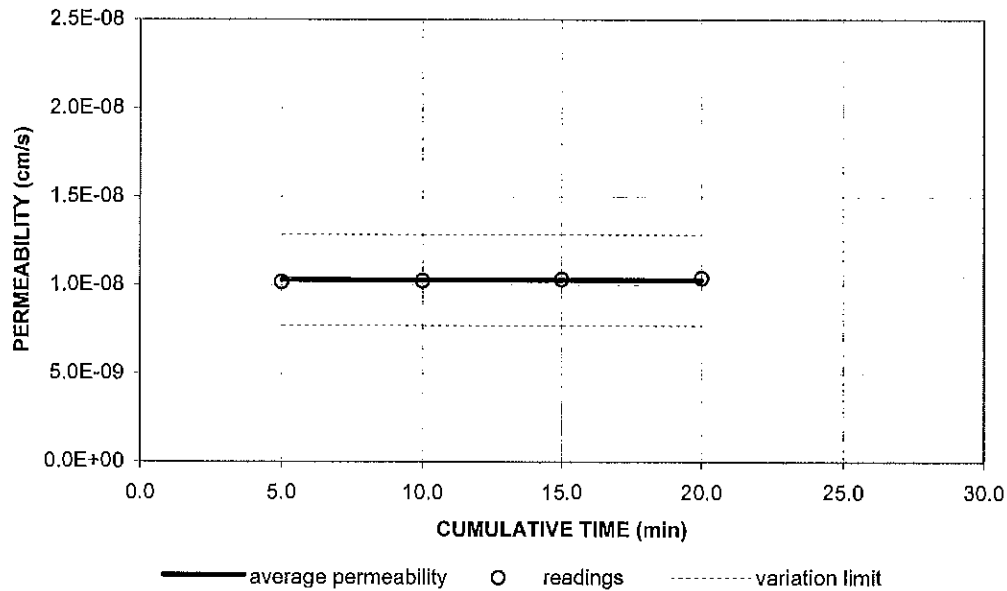
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.85	9.78E-09	9.9E-09
21.00	5.00	10.00	13.76	9.85E-09	
21.00	5.00	15.00	13.66	9.92E-09	
21.00	5.00	20.00	13.56	9.99E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.87	2.88
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		25.80	28.09
% Recompt.		Percent Saturation (%)		92.84	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		122.36	124.23
Backpressure	90.00	Dry Mass Density (pcf)		97.26	96.99
Cell pressure	100.00	Void Ratio		0.76	0.77
Eff. Stress	10.00	Calculated Porosity, %		43.32	43.58

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Brown & Reddish Brown Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5853					
Sample Location	P-19					
Date	8/14/2009	Lab No.	5853			

FLEXIBLE WALL PERMEABILITY TEST



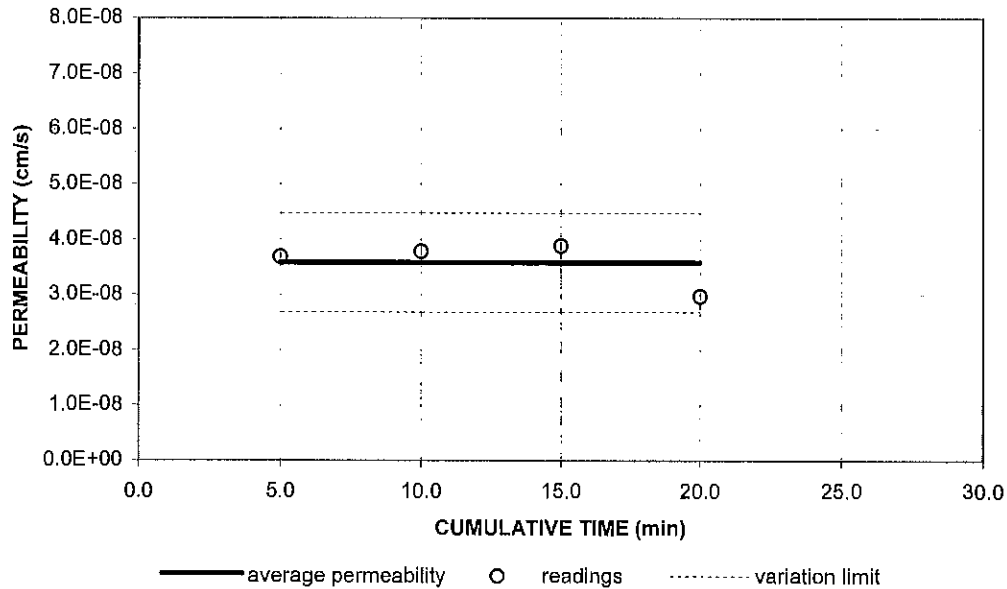
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.24	1.02E-08	1.0E-08
21.00	5.00	10.00	13.15	1.02E-08	
21.00	5.00	15.00	13.05	1.03E-08	
21.00	5.00	20.00	12.96	1.04E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.94	2.93
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		28.36	29.86
% Recompct.		Percent Saturation (%)		91.33	96.86
Test Pressures (psi)		Wet Mass Density (pcf)		118.81	120.60
Backpressure	90.00	Dry Mass Density (pcf)		92.56	92.87
Cell pressure	100.00	Void Ratio		0.85	0.85
Eff. Stress	10.00	Calculated Porosity, %		46.06	45.88

USCS		LL		PI	
Permeant Used:		WATER		Remarks	
				Brown Fat clay w/tr rock frags	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by	
Client		WM		FCE	
		W.O.#		Reviewed by	
Sample Number		S-5854		TGG	
Sample Location		P-20		FLEXIBLE WALL PERMEABILITY TEST	
Date		8/17/2009			
		Lab No.		Terracon	
		5854			

FLEXIBLE WALL PERMEABILITY TEST



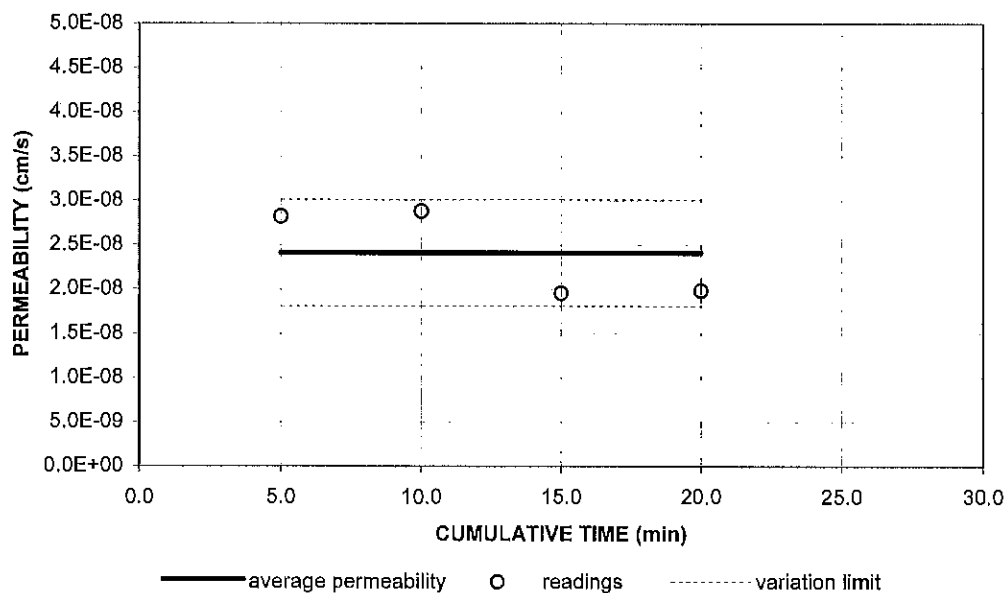
Test Specification: **ASTM D 5084**

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.55	3.68E-08	3.6E-08
21.00	5.00	10.00	14.17	3.78E-08	
21.00	5.00	15.00	13.80	3.88E-08	
21.00	5.00	20.00	13.52	2.98E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.98	2.98
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		25.48	27.08
% Recompt.		Percent Saturation (%)		94.44	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		123.61	125.39
Backpressure	90.00	Dry Mass Density (pcf)		98.50	98.67
Cell pressure	100.00	Void Ratio		0.74	0.74
Eff. Stress	10.00	Calculated Porosity, %		42.60	42.68

USCS		LL		PI	
Permeant Used:		WATER		Remarks	
				Reddish Bn & Br Fat clay	
Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE
Client	WM	W.O.#	35097116	Reviewed by	TGG
Sample Number	S-5855				
Sample Location	P-21				
Date	8/17/2009	Lab No.	5855	FLEXIBLE WALL PERMEABILITY TEST Terracon	

FLEXIBLE WALL PERMEABILITY TEST



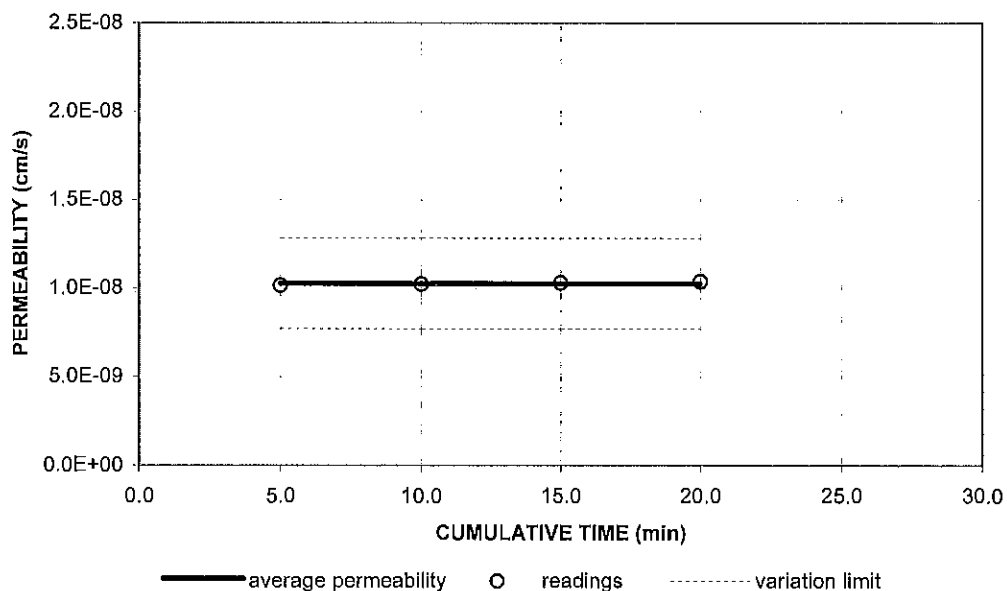
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.22	2.82E-08	2.4E-08
21.00	5.00	10.00	13.93	2.88E-08	
21.00	5.00	15.00	13.73	1.95E-08	
21.00	5.00	20.00	13.53	1.98E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.83	2.87
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		28.84	35.30
% Recompt.		Percent Saturation (%)		86.37	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		114.16	118.46
Backpressure	90.00	Dry Mass Density (pcf)		88.61	87.56
Cell pressure	100.00	Void Ratio		0.90	0.95
Eff. Stress	10.00	Calculated Porosity, %		47.41	48.80

USCS		LL		PI	
Permeant Used:		WATER		Remarks Brown Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG	
Client		WM W.O.# 35097113		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number		S-5856			
Sample Location		P-22			
Date		8/17/2009 Lab No. 5856			

FLEXIBLE WALL PERMEABILITY TEST



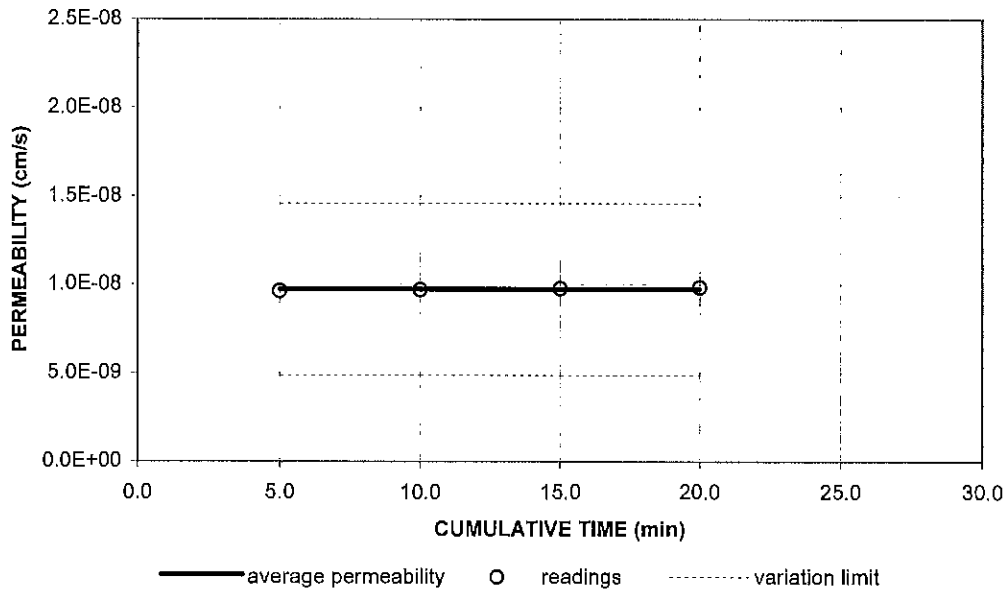
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.25	1.02E-08	1.0E-08
21.00	5.00	10.00	13.16	1.02E-08	
21.00	5.00	15.00	13.06	1.03E-08	
21.00	5.00	20.00	12.97	1.04E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.89	2.99
Opti. M.C., (%)		Specimen Diameter, (inches)	2.84	2.84
Comp. Method		Moisture Content, (%)	32.16	33.40
% Recompt.		Percent Saturation (%)	99.27	96.19
Test Pressures (psi)		Wet Mass Density (pcf)	118.77	116.00
Backpressure	90.00	Dry Mass Density (pcf)	89.87	86.95
Cell pressure	100.00	Void Ratio	0.87	0.94
Eff. Stress	10.00	Calculated Porosity, %	46.66	48.39

USCS		LL	PI
Permeant Used: WATER		Remarks	Brown & Gray Fat clay
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5857		
Sample Location	P-23		
Date	8/17/2009	Lab No.	5857

FLEXIBLE WALL PERMEABILITY TEST



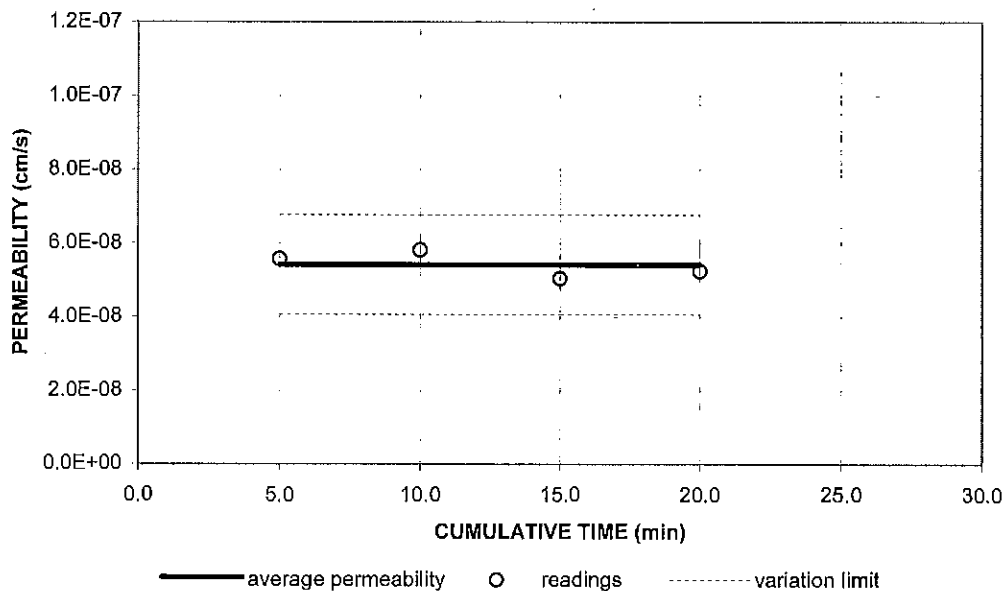
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.05	9.62E-09	9.7E-09
21.00	5.00	10.00	13.96	9.69E-09	
21.00	5.00	15.00	13.86	9.76E-09	
21.00	5.00	20.00	13.76	9.83E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.83	2.83
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		29.84	31.95
% Recompt.		Percent Saturation (%)		90.75	97.11
Test Pressures (psi)		Wet Mass Density (pcf)		116.33	118.19
Backpressure	90.00	Dry Mass Density (pcf)		89.60	89.57
Cell pressure	100.00	Void Ratio		0.89	0.89
Eff. Stress	10.00	Calculated Porosity, %		47.21	47.23

USCS		LL		PI	
Permeant Used: WATER		Remarks		Brown Fat clay	
Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number	S-5858				
Sample Location	P-24				
Date	8/17/2009	Lab No.	5858		

FLEXIBLE WALL PERMEABILITY TEST



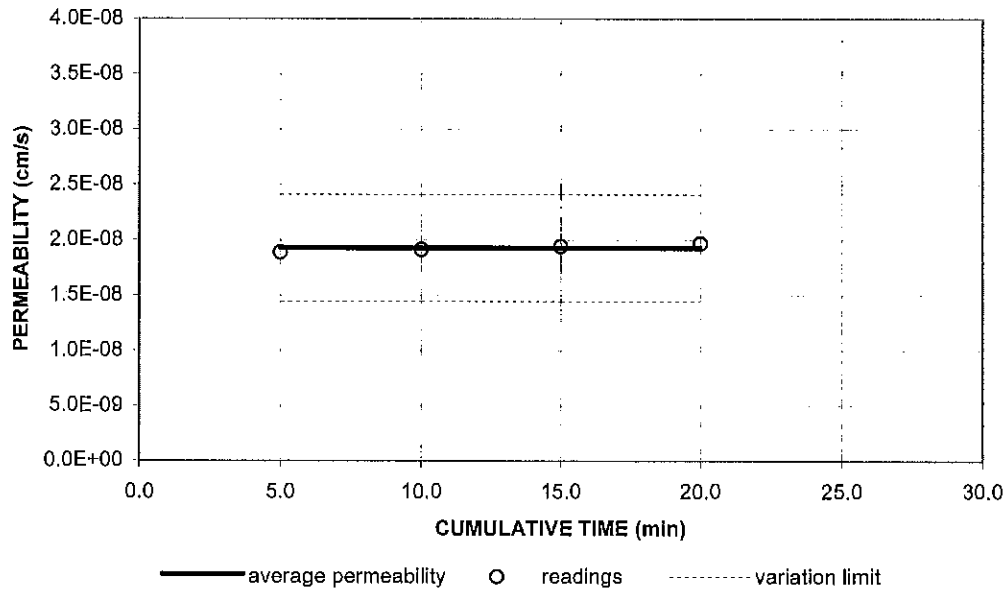
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.39	5.57E-08	5.4E-08
21.00	5.00	10.00	13.78	5.81E-08	
21.00	5.00	15.00	13.27	5.04E-08	
21.00	5.00	20.00	12.77	5.24E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.74	2.76
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		29.86	32.51
% Recompct.		Percent Saturation (%)		88.03	94.85
Test Pressures (psi)		Wet Mass Density (pcf)		114.64	116.40
Backpressure	90.00	Dry Mass Density (pcf)		88.29	87.84
Cell pressure	100.00	Void Ratio		0.92	0.93
Eff. Stress	10.00	Calculated Porosity, %		47.98	48.25

USCS		LL	PI
Permeant Used: WATER		Remarks	ReddishBn Fat clay w/tr rock frags
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5859		
Sample Location	P-25		
Date	8/17/2009 Lab No. 5859		

FLEXIBLE WALL PERMEABILITY TEST



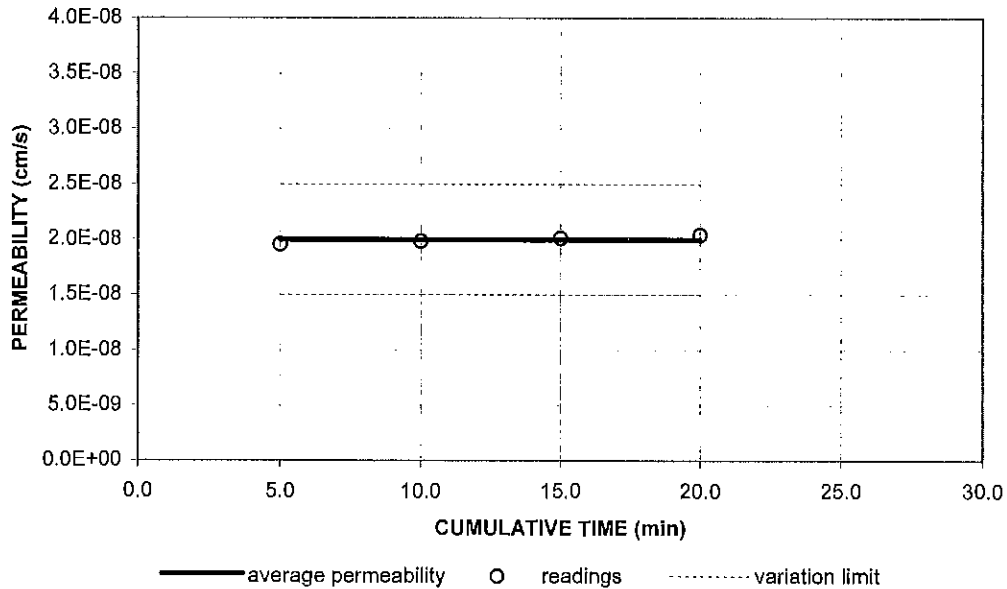
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.16	1.89E-08	1.9E-08
21.00	5.00	10.00	13.97	1.91E-08	
21.00	5.00	15.00	13.77	1.94E-08	
21.00	5.00	20.00	13.58	1.97E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.87	2.87
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		33.58	34.88
% Recompct.		Percent Saturation (%)		96.59	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		116.53	117.59
Backpressure	90.00	Dry Mass Density (pcf)		87.24	87.18
Cell pressure	100.00	Void Ratio		0.95	0.95
Eff. Stress	10.00	Calculated Porosity, %		48.60	48.69

USCS		LL		PI						
Permeant Used:		WATER		Remarks		Reddish Bn & Br Fat clay				
Project Name		WM TWO PINE-CELL 3 CQA			Tested by		FCE	Reviewed by		TGG
Client		WM		W.O.#		35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number		S-5860								
Sample Location		P-26								
Date		8/17/2009		Lab No.		5860				

FLEXIBLE WALL PERMEABILITY TEST



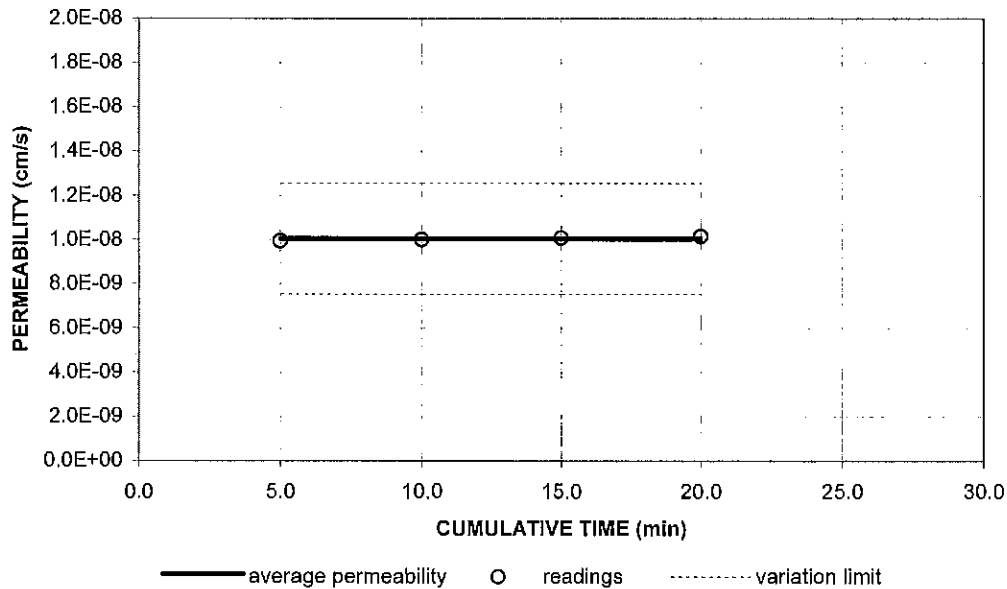
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.68	1.95E-08	2.0E-08
21.00	5.00	10.00	13.49	1.98E-08	
21.00	5.00	15.00	13.30	2.01E-08	
21.00	5.00	20.00	13.11	2.04E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.93	2.93
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		44.85	45.52
% Recompt.		Percent Saturation (%)		97.64	99.09
Test Pressures (psi)		Wet Mass Density (pcf)		109.30	109.80
Backpressure	90.00	Dry Mass Density (pcf)		75.45	75.45
Cell pressure	100.00	Void Ratio		1.25	1.25
Eff. Stress	10.00	Calculated Porosity, %		55.54	55.54

USCS		LL	PI			
Permeant Used: WATER		Remarks	Br & Gr Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5861					
Sample Location	P-27					
Date	8/17/2009	Lab No.	5861			

FLEXIBLE WALL PERMEABILITY TEST



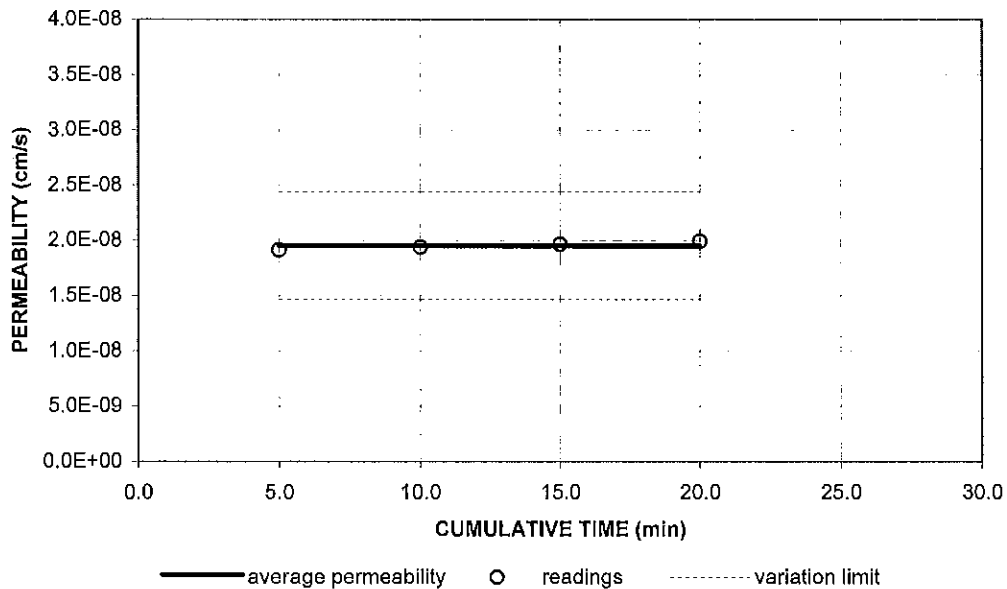
Test Specification: **ASTM D 5084**

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.73	9.94E-09	1.0E-08
21.00	5.00	10.00	13.63	1.00E-08	
21.00	5.00	15.00	13.54	1.01E-08	
21.00	5.00	20.00	13.44	1.02E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.89	2.90
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		31.51	33.83
% Recompct.		Percent Saturation (%)		96.82	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		118.40	120.42
Backpressure	90.00	Dry Mass Density (pcf)		90.04	89.97
Cell pressure	100.00	Void Ratio		0.89	0.92
Eff. Stress	10.00	Calculated Porosity, %		46.95	47.92

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Red. Br, Br & Gr Fat clay w/tr rock frags.			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5862					
Sample Location	P-28					
Date	8/18/2009	Lab No.	5862			

FLEXIBLE WALL PERMEABILITY TEST



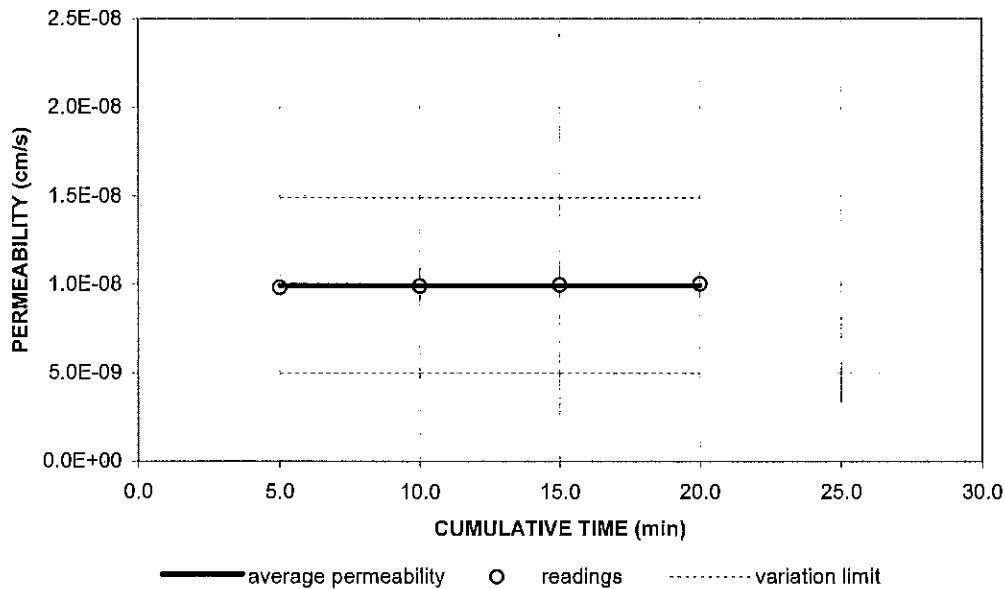
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.19	1.91E-08	2.0E-08
21.00	5.00	10.00	14.00	1.94E-08	
21.00	5.00	15.00	13.81	1.96E-08	
21.00	5.00	20.00	13.61	1.99E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.90	2.90
Opti. M.C., (%)		Specimen Diameter, (inches)	2.83	2.83
Comp. Method		Moisture Content, (%)	28.57	30.37
% Recompt.		Percent Saturation (%)	90.60	96.11
Test Pressures (psi)		Wet Mass Density (pcf)	117.00	118.52
Backpressure	90.00	Dry Mass Density (pcf)	91.00	90.91
Cell pressure	100.00	Void Ratio	0.85	0.85
Eff. Stress	10.00	Calculated Porosity, %	45.99	46.04

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Br & Gr Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5863					
Sample Location	P-29					
Date	8/18/2009	Lab No.	5863			

FLEXIBLE WALL PERMEABILITY TEST



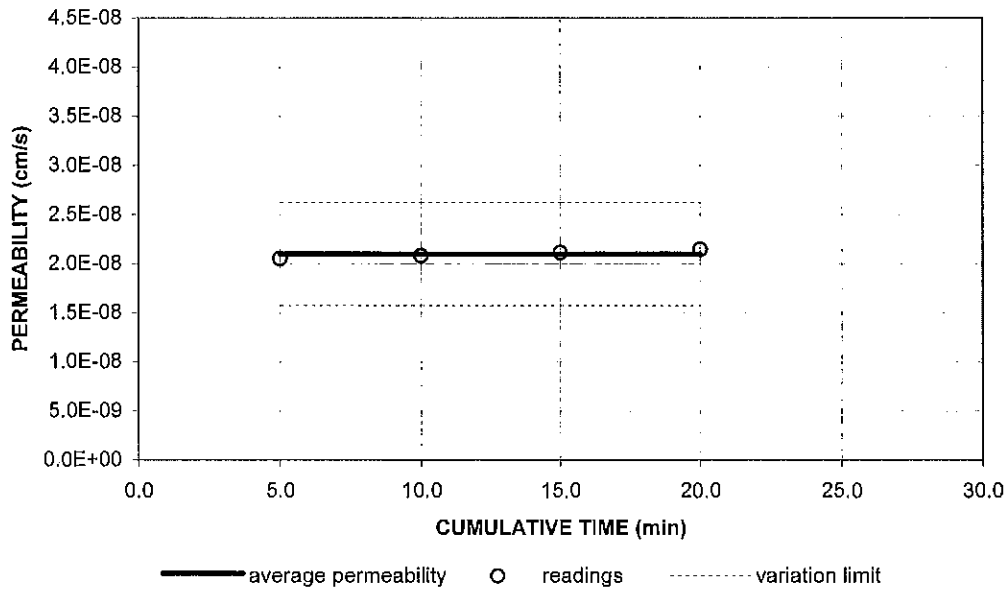
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.69	9.82E-09	9.9E-09
21.00	5.00	10.00	13.59	9.89E-09	
21.00	5.00	15.00	13.50	9.96E-09	
21.00	5.00	20.00	13.40	1.00E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.90	2.92
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		28.13	31.32
% Recompt.		Percent Saturation (%)		94.86	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.89	122.08
Backpressure	90.00	Dry Mass Density (pcf)		93.57	92.97
Cell pressure	100.00	Void Ratio		0.80	0.85
Eff. Stress	10.00	Calculated Porosity, %		44.46	45.82

USCS		LL	PI			
Permeant Used:		WATER	Remarks	Red Br Fat clay w/tr rock frags.		
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5864					
Sample Location	P-30					
Date	8/18/2009	Lab No.	5864			

FLEXIBLE WALL PERMEABILITY TEST



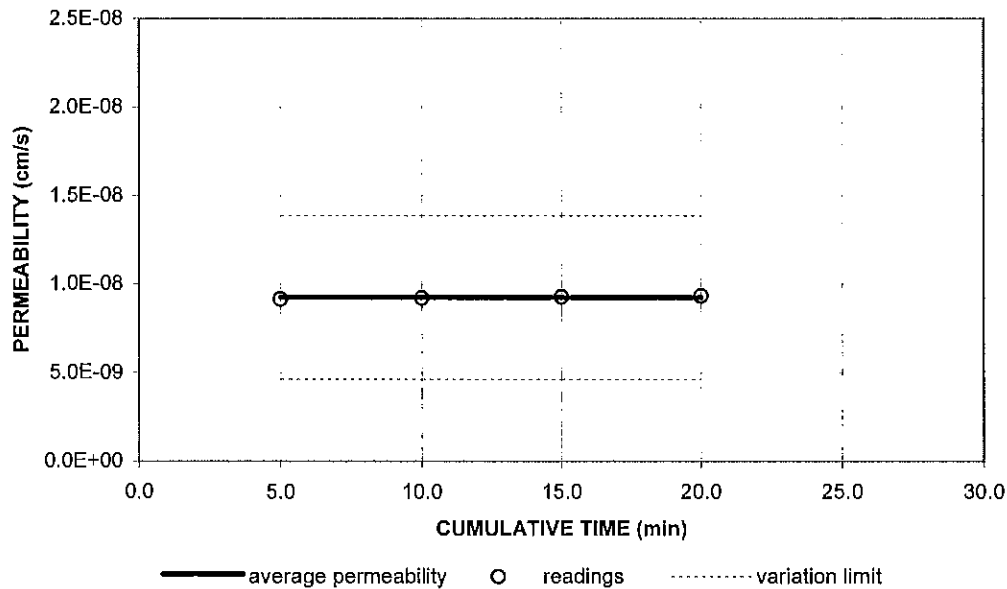
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.26	2.05E-08	2.1E-08
21.00	5.00	10.00	13.06	2.08E-08	
21.00	5.00	15.00	12.87	2.11E-08	
21.00	5.00	20.00	12.67	2.14E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.85	2.85
Opti. M.C., (%)		Specimen Diameter, (inches)	2.83	2.83
Comp. Method		Moisture Content, (%)	34.06	37.05
% Recompct.		Percent Saturation (%)	95.43	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	115.02	117.66
Backpressure	90.00	Dry Mass Density (pcf)	85.79	85.85
Cell pressure	100.00	Void Ratio	0.96	1.00
Eff. Stress	10.00	Calculated Porosity, %	49.08	50.01

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Br Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5865					
Sample Location	P-31					
Date	8/18/2009	Lab No.	5865			

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

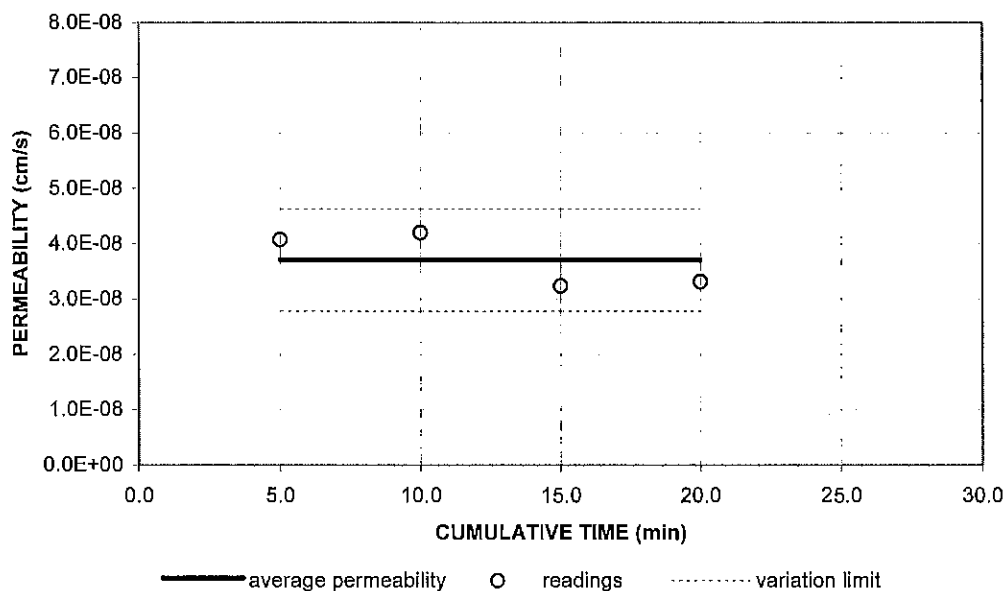
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.82	9.15E-09	9.2E-09
21.00	5.00	10.00	14.73	9.21E-09	
21.00	5.00	15.00	14.63	9.27E-09	
21.00	5.00	20.00	14.53	9.33E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.87	2.89
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		32.65	38.55
% Recompct.		Percent Saturation (%)		97.90	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		117.60	121.90
Backpressure	90.00	Dry Mass Density (pcf)		88.66	87.98
Cell pressure	100.00	Void Ratio		0.90	1.04
Eff. Stress	10.00	Calculated Porosity, %		47.38	51.00

USCS		LL		PI	
Permeant Used:		WATER		Remarks Br Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG	
Client		WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number		S-5915			
Sample Location		P-32			
Date		8/18/2009 Lab No. 5915			

8/18/2009

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.12	4.07E-08	3.7E-08
21.00	5.00	10.00	12.72	4.20E-08	
21.00	5.00	15.00	12.42	3.24E-08	
21.00	5.00	20.00	12.12	3.31E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.80	2.77
Optl. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		31.14	31.68
% Recompt.		Percent Saturation (%)		87.92	90.98
Test Pressures (psi)		Wet Mass Density (pcf)		112.94	114.34
Backpressure	90.00	Dry Mass Density (pcf)		86.12	86.83
Cell pressure	100.00	Void Ratio		0.96	0.94
Eff. Stress	10.00	Calculated Porosity, %		48.88	48.46

USCS

LL

PI

Permeant Used:

WATER

Remarks

Br & Gr Lean clay w/fat clay lumps

Project Name WM TWO PINE-CELL 3 CQA
 Client WM W.O.# 35097116
 Sample Number S-5916
 Sample Location P-33
 Date 8/18/2009 Lab No. 5916

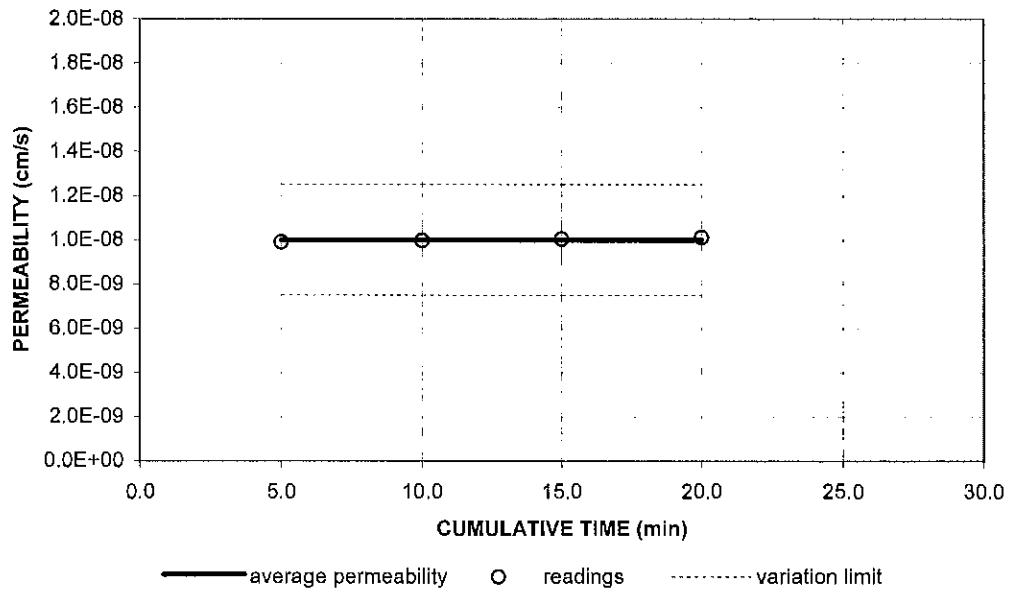
Tested by FCE Reviewed by TGG

FLEXIBLE WALL PERMEABILITY TEST

Terracon

8/18/2009

FLEXIBLE WALL PERMEABILITY TEST



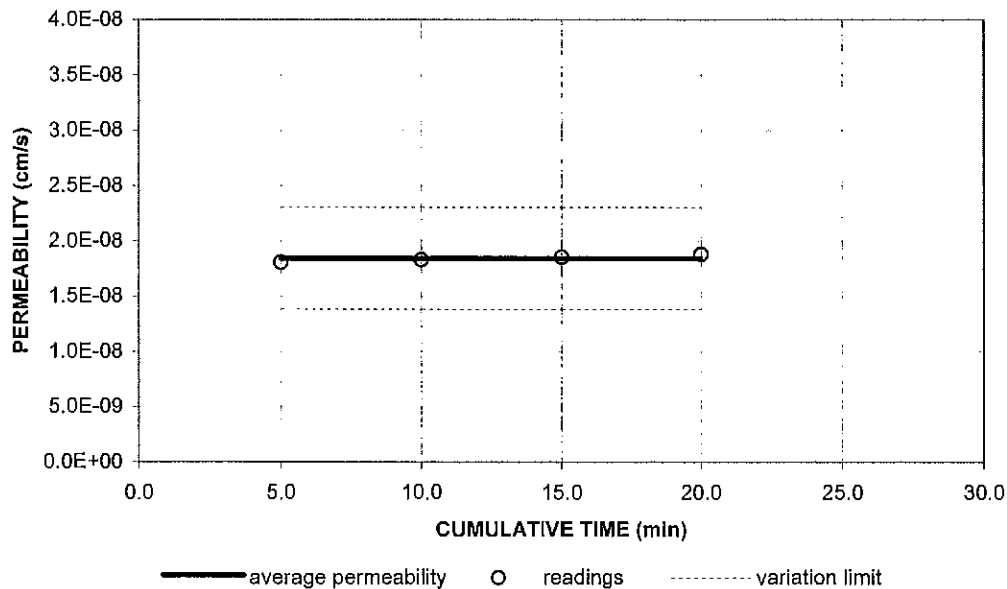
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.62	9.90E-09	1.0E-08
21.00	5.00	10.00	13.53	9.97E-09	
21.00	5.00	15.00	13.43	1.00E-08	
21.00	5.00	20.00	13.34	1.01E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.96	2.97
Opti. M.C., (%)		Specimen Diameter, (inches)		2.84	2.84
Comp. Method		Moisture Content, (%)		38.76	42.08
% Recompct.		Percent Saturation (%)		100.93	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		114.78	117.14
Backpressure	90.00	Dry Mass Density (pcf)		82.72	82.44
Cell pressure	100.00	Void Ratio		1.04	1.14
Eff. Stress	10.00	Calculated Porosity, %		50.90	53.19

USCS		LL	PI
Permeant Used: WATER		Remarks	Br Fat clay w/tr rock frags
Project Name	WM TWO PINE-CELL 3 CQA	Tested by	FCE Reviewed by TGG
Client	WM W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST 	
Sample Number	S-5917		
Sample Location	P-34		
Date	8/18/2009 Lab No. 5917		

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

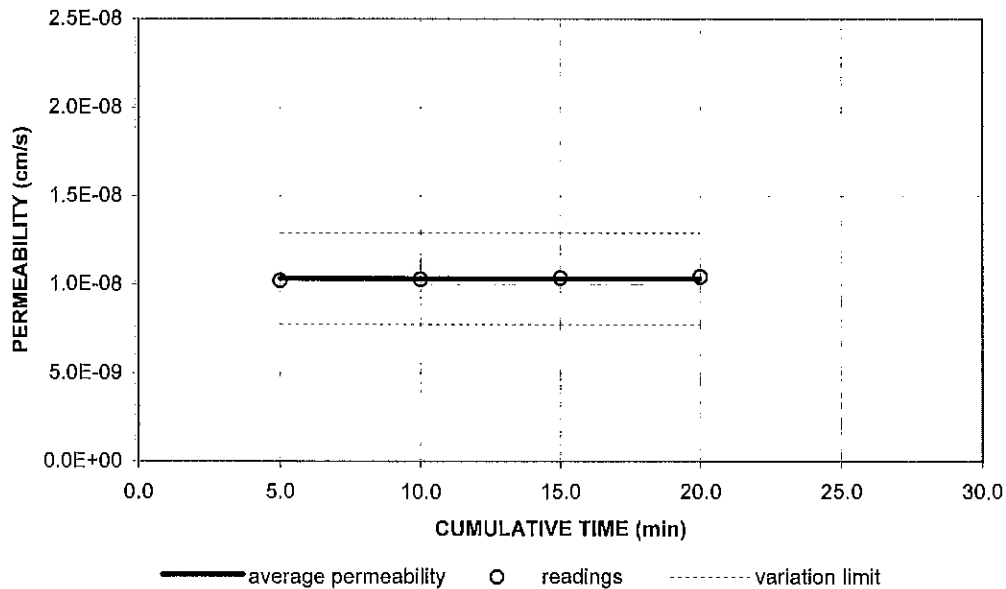
Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.81	1.81E-08	1.8E-08
21.00	5.00	10.00	14.61	1.83E-08	
21.00	5.00	15.00	14.42	1.85E-08	
21.00	5.00	20.00	14.23	1.88E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.89	2.92
Opti. M.C., (%)		Specimen Diameter, (inches)		2.85	2.85
Comp. Method		Moisture Content, (%)		36.44	41.34
% Recompct.		Percent Saturation (%)		99.08	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		115.34	118.34
Backpressure	90.00	Dry Mass Density (pcf)		84.54	83.73
Cell pressure	100.00	Void Ratio		0.99	1.12
Eff. Stress	10.00	Calculated Porosity, %		49.82	52.75

USCS	LL	PI
Permeant Used: WATER	Remarks	Br & Gr Fat clay w/tr rock frags.

Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number	S-5918						
Sample Location	P-35						
Date	8/18/2009	Lab No.	5918				

FLEXIBLE WALL PERMEABILITY TEST



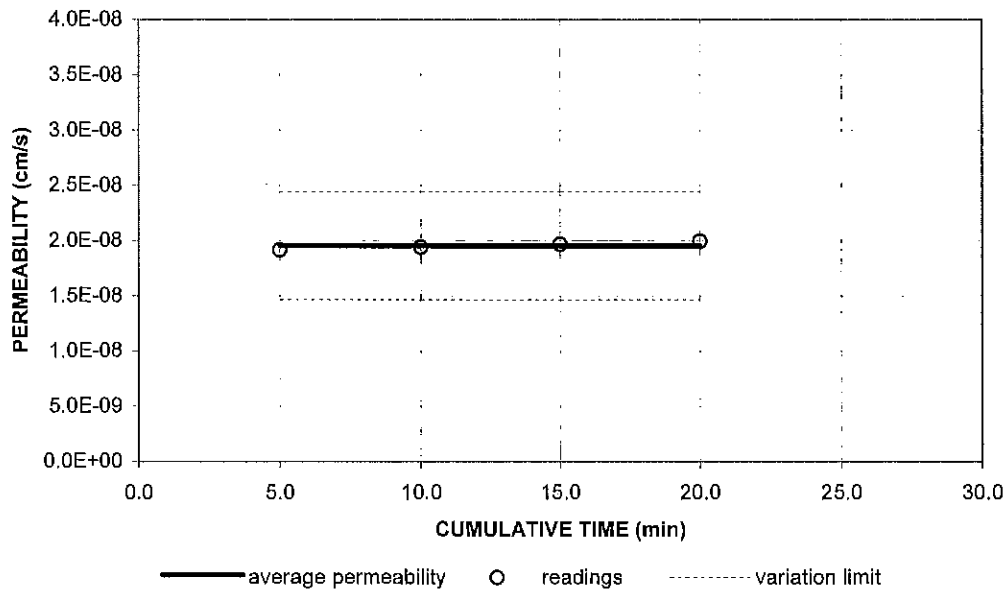
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.22	1.02E-08	1.0E-08
21.00	5.00	10.00	13.12	1.03E-08	
21.00	5.00	15.00	13.03	1.04E-08	
21.00	5.00	20.00	12.93	1.04E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.92	2.95
Opti. M.C., (%)		Specimen Diameter, (inches)	2.84	2.84
Comp. Method		Moisture Content, (%)	31.96	36.27
% Recompct.		Percent Saturation (%)	97.54	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	117.97	120.66
Backpressure	90.00	Dry Mass Density (pcf)	89.40	88.55
Cell pressure	100.00	Void Ratio	0.88	0.98
Eff. Stress	10.00	Calculated Porosity, %	46.94	49.47

USCS		LL	PI	
Permeant Used:	WATER	Remarks	Br Fat clay	
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST
Sample Number	S-5919			
Sample Location	P-36			
Date	8/18/2009	Lab No.	5919	

FLEXIBLE WALL PERMEABILITY TEST



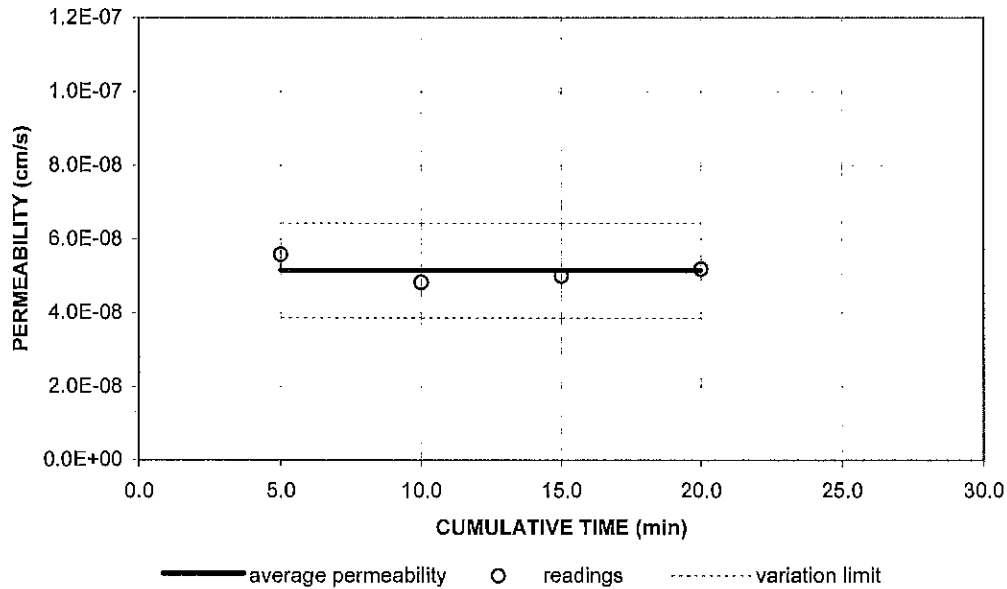
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.13	1.92E-08	2.0E-08
21.00	5.00	10.00	13.94	1.94E-08	
21.00	5.00	15.00	13.75	1.97E-08	
21.00	5.00	20.00	13.57	1.99E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.99	2.98
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		29.15	31.03
% Recompct.		Percent Saturation (%)		94.92	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		118.96	121.05
Backpressure	90.00	Dry Mass Density (pcf)		92.11	92.39
Cell pressure	100.00	Void Ratio		0.83	0.84
Eff. Stress	10.00	Calculated Porosity, %		45.33	45.58

USCS		LL		PI	
Permeant Used: WATER		Remarks		Br Fat clay	
Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number	S-5920				
Sample Location	P-37				
Date	8/18/2009	Lab No.	5920		

FLEXIBLE WALL PERMEABILITY TEST



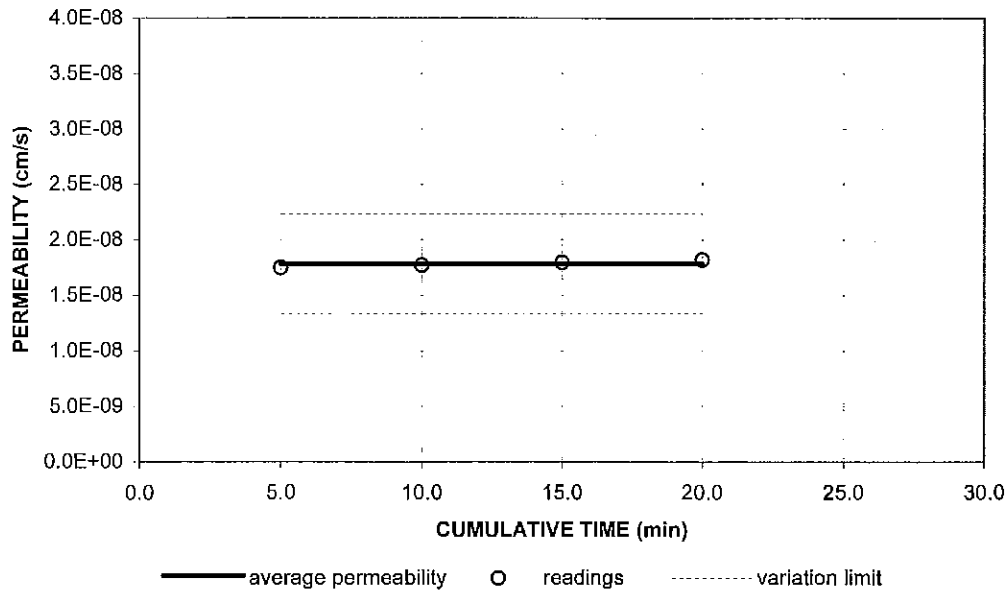
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.34	5.58E-08	5.1E-08
21.00	5.00	10.00	13.86	4.83E-08	
21.00	5.00	15.00	13.37	5.00E-08	
21.00	5.00	20.00	12.89	5.18E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.87	2.87
Optl. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		19.93	22.73
% Recompt.		Percent Saturation (%)		94.10	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		128.54	131.27
Backpressure	90.00	Dry Mass Density (pcf)		107.18	106.95
Cell pressure	100.00	Void Ratio		0.57	0.61
Eff. Stress	10.00	Calculated Porosity, %		36.38	38.04

USCS		LL		PI	
Permeant Used:		WATER		Remarks Br & Gr Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE	
Client		WM W.O.# 35097116		Reviewed by TGG	
Sample Number		S-5921		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Location		P-38			
Date		8/18/2009			
		Lab No.		5921	

FLEXIBLE WALL PERMEABILITY TEST



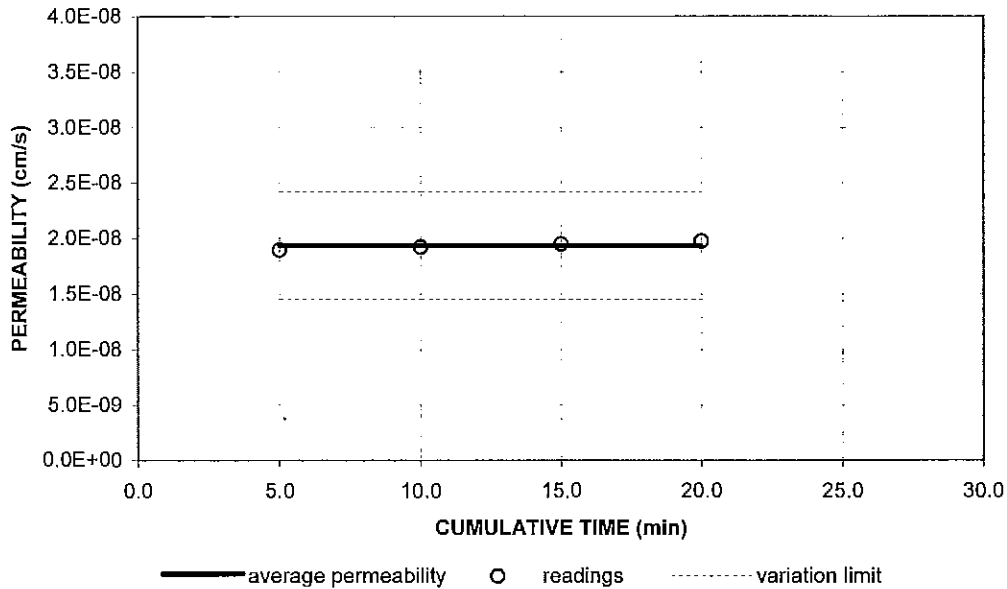
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	15.49	1.75E-08	1.8E-08
21.00	5.00	10.00	15.29	1.77E-08	
21.00	5.00	15.00	15.09	1.80E-08	
21.00	5.00	20.00	14.90	1.82E-08	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.84	2.84
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		33.63	37.23
% Recompect.		Percent Saturation (%)		97.57	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		116.62	119.67
Backpressure	90.00	Dry Mass Density (pcf)		87.27	87.21
Cell pressure	100.00	Void Ratio		0.93	1.01
Eff. Stress	10.00	Calculated Porosity, %		48.20	50.13

USCS		LL		PI	
Permeant Used:		WATER		Remarks Red. Br Fat clay	
Project Name		WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG	
Client		WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon	
Sample Number		S-5922			
Sample Location		P-39			
Date		8/19/2009 Lab No. 5922			

FLEXIBLE WALL PERMEABILITY TEST



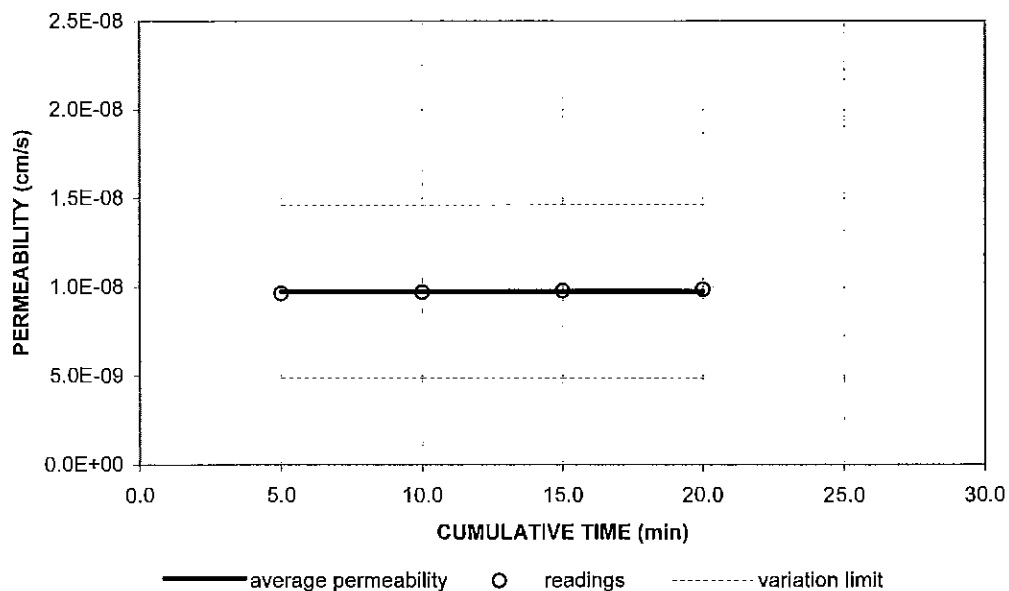
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.25	1.90E-08	1.9E-08
21.00	5.00	10.00	14.06	1.92E-08	
21.00	5.00	15.00	13.86	1.95E-08	
21.00	5.00	20.00	13.67	1.98E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.89	2.90
Opti. M.C., (%)		Specimen Diameter, (inches)	2.84	2.84
Comp. Method		Moisture Content, (%)	33.89	37.85
% Recompt.		Percent Saturation (%)	99.63	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	117.58	120.39
Backpressure	90.00	Dry Mass Density (pcf)	87.82	87.33
Cell pressure	100.00	Void Ratio	0.92	1.02
Eff. Stress	10.00	Calculated Porosity, %	47.88	50.54

USCS		LL	PI
Permeant Used:	WATER	Remarks	Red Br & Br Fat clay w/tr rock frags
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5923		
Sample Location	P-40		
Date	8/18/2009	Lab No. 5923	

FLEXIBLE WALL PERMEABILITY TEST



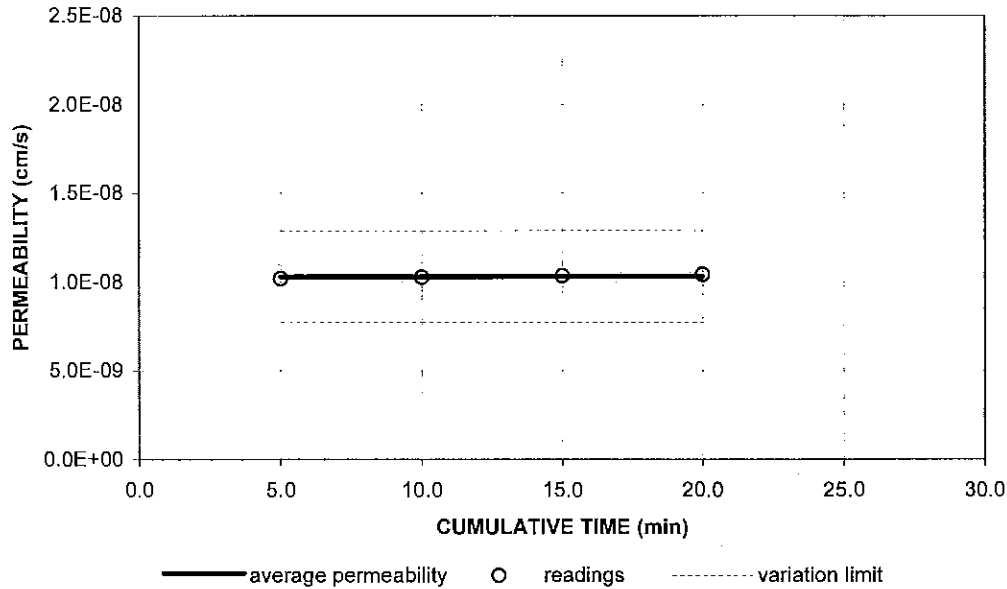
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.99	9.65E-09	9.8E-09
21.00	5.00	10.00	13.89	9.72E-09	
21.00	5.00	15.00	13.79	9.79E-09	
21.00	5.00	20.00	13.70	9.86E-09	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.84	2.84
Opti. M.C., (%)		Specimen Diameter, (inches)	2.84	2.84
Comp. Method		Moisture Content, (%)	30.00	31.50
% Recompt.		Percent Saturation (%)	96.59	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	119.12	120.58
Backpressure	90.00	Dry Mass Density (pcf)	91.63	91.70
Cell pressure	100.00	Void Ratio	0.84	0.85
Eff. Stress	10.00	Calculated Porosity, %	45.61	45.96

USCS		LL	PI
Permeant Used: WATER		Remarks	Br Fat clay w/tr rock frags.
Project Name	WM TWO PINE-CELL 3 CQA		Tested by FCE Reviewed by TGG
Client	WM	W.O.# 35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon
Sample Number	S-5924		
Sample Location	P-41		
Date	8/19/2009	Lab No. 5924	

FLEXIBLE WALL PERMEABILITY TEST



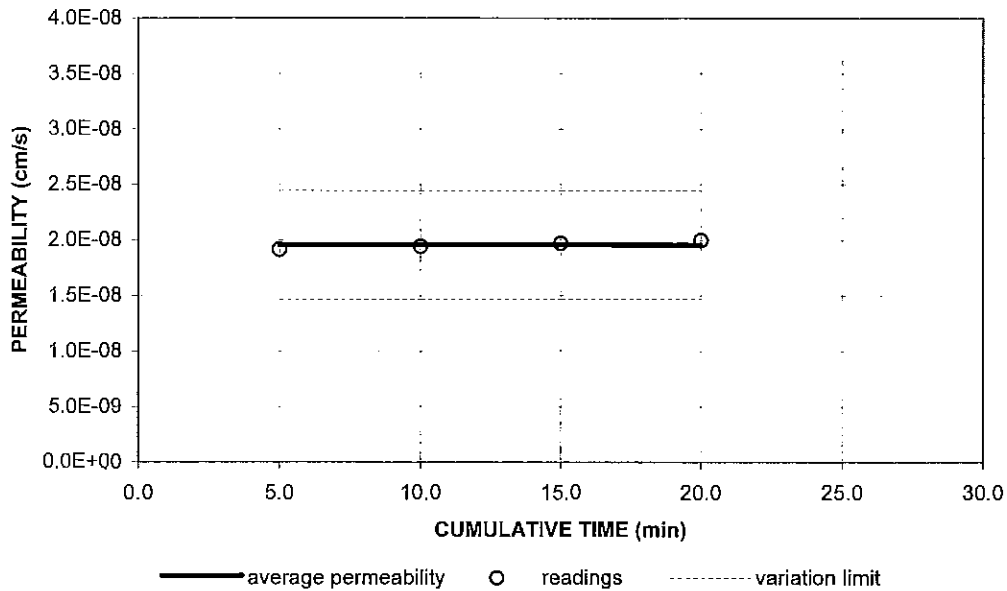
Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.19	1.02E-08	1.0E-08
21.00	5.00	10.00	13.10	1.03E-08	
21.00	5.00	15.00	13.00	1.03E-08	
21.00	5.00	20.00	12.91	1.04E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.89	2.88
Opti. M.C., (%)		Specimen Diameter, (inches)	2.85	2.85
Comp. Method		Moisture Content, (%)	33.91	36.01
% Recompt.		Percent Saturation (%)	96.41	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	115.72	117.86
Backpressure	90.00	Dry Mass Density (pcf)	86.42	86.66
Cell pressure	100.00	Void Ratio	0.95	0.97
Eff. Stress	10.00	Calculated Porosity, %	48.71	49.30

USCS		LL	PI			
Permeant Used:	WATER	Remarks	Br Fat clay			
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Reviewed by	TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST Terracon		
Sample Number	S-5925					
Sample Location	P-42					
Date	8/19/2009	Lab No.	5925			

FLEXIBLE WALL PERMEABILITY TEST



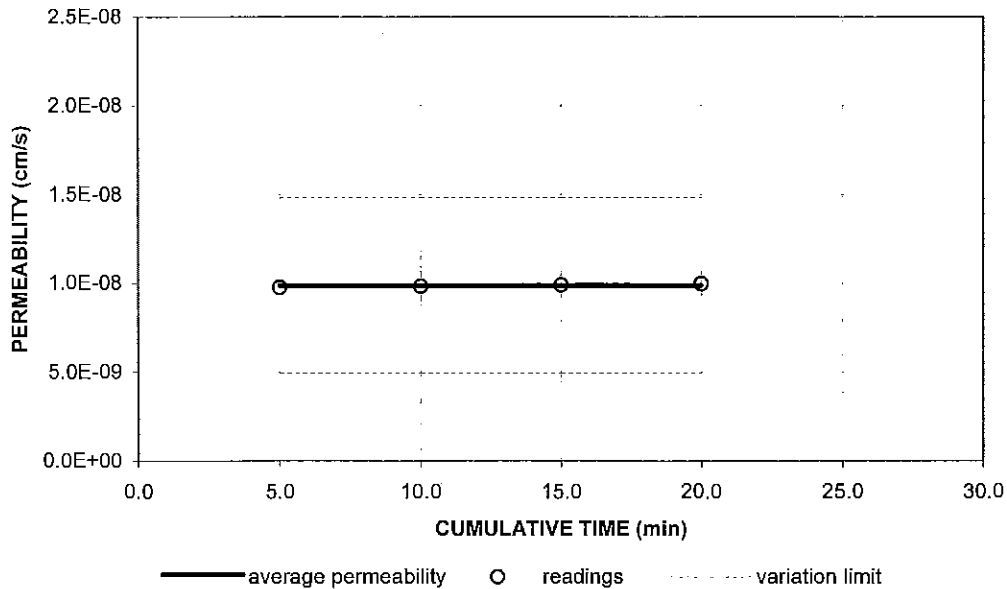
Test Specification: **ASTM D 5084**

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.05	1.92E-08	2.0E-08
21.00	5.00	10.00	13.85	1.94E-08	
21.00	5.00	15.00	13.66	1.97E-08	
21.00	5.00	20.00	13.47	2.00E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)		Specimen Height, (inches)	2.89	2.88
Opti. M.C., (%)		Specimen Diameter, (inches)	2.84	2.84
Comp. Method		Moisture Content, (%)	30.72	32.83
% Recompct.		Percent Saturation (%)	98.42	100.00
Test Pressures (psi)		Wet Mass Density (pcf)	119.52	121.78
Backpressure	90.00	Dry Mass Density (pcf)	91.43	91.68
Cell pressure	100.00	Void Ratio	0.84	0.89
Eff. Stress	10.00	Calculated Porosity, %	45.73	46.99

USCS		LL	PI	
Permeant Used:	WATER	Remarks	Br Fat clay w/tr rock frags	
Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE Reviewed by TGG
Client	WM	W.O.#	35097116	FLEXIBLE WALL PERMEABILITY TEST
Sample Number	S-5982			
Sample Location	P-43			
Date	8/19/2009	Lab No.	5982	

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	13.91	9.78E-09	9.9E-09
21.00	5.00	10.00	13.82	9.84E-09	
21.00	5.00	15.00	13.72	9.91E-09	
21.00	5.00	20.00	13.63	9.98E-09	

Compaction Data		Sample Data		Initial	Final
Proctor (pcf)		Specimen Height, (inches)		2.98	2.98
Opti. M.C., (%)		Specimen Diameter, (inches)		2.83	2.83
Comp. Method		Moisture Content, (%)		29.48	31.64
% Recompt.		Percent Saturation (%)		97.21	100.00
Test Pressures (psi)		Wet Mass Density (pcf)		119.94	121.82
Backpressure	90.00	Dry Mass Density (pcf)		92.64	92.54
Cell pressure	100.00	Void Ratio		0.82	0.85
Eff. Stress	10.00	Calculated Porosity, %		45.02	46.07

USCS		LL		PI	
Permeant Used: WATER		Remarks		Red. Br & Br Fat clay	
Project Name WM TWO PINE-CELL 3 CQA		Tested by FCE		Reviewed by TGG	
Client WM W.O.# 35097116		FLEXIBLE WALL PERMEABILITY TEST Terracon			
Sample Number S-5983					
Sample Location P-44					
Date 8/19/2009 Lab No. 5983					

APPENDIX G

GEOSYNTHETICS INSTALLER'S INFORMATION

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Rone Intyrath

Page 1

POSITION: Supervisor

EXPERIENCE: Has worked on the following projects since 08/12/85

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
CHESAPEAKE CORP SUMP LINERS	FREDERICKSBURG VA	538
TEXAS GULF GYPSUM STACK 3-4	AURORA NC	8,400
ROLLINS ENVIRO ASH/SLUDG	DEER PARK TX	1,582
SAN LUIS CANAL	LOS BANOS CA	133,450
RODMAN LANDFILL	RODMAN NY	35,768
110 SAND PHASE VI	MELVILLE NY	42,500
LIVINGSTON LANDFILL	PONTIAC IL	25,376
CAROLINA FOOD PROCESSORS POND	TAR HEEL NC	141,178
CIBA GEIGY CELL 11-13	McINTOSH AL	9,663
PALM BEACH COUNTY LF PH 2	W. PALM BEACH FL	228,369
ST LUCIE COUNTY	FT. PEARCE FL	555,520
FORT MEADE	FORT MEADE FL	336,320
COAL CREEK PONDS 92 & 94	UNDERWOOD ND	1,490,148
CWM LAKE CHARLES	SULPHUR LA	104,029
CITY OF LUBBOCK	LUBBOCK TX	503,535
CSG REPUBLIC WASTE	AVALON TX	16,665
SOUTHERN PACIFIC TRANSPORTATION	HOUSTON TX	4,640
WESTERN WASTE	CONROE TX	105,880
AGRICO CHEMICAL	ST JAMES LA	3,640,461
BFI FM 521	FRESNO TX	129,259
ST. JOHNS LF SUBAREA 1	PORTLAND OR	1,233,961
FORMOSA EXPLORATION	RIDDLE OR	311,029
SNOHOMISH COUNTY LANDFILL	SNOHOMISH WA	501,119
CEDARILLE LANDFILL	CEDARVILLE WA	761,685
COWLITZ COUNTY LANDFILL	LONGVIEW WA	1,777,866
ATOCHEM WASTE CONTAINMENT	TACOMA WA	339,854
ENVIROSAFE MANAGEMENT	GRANDVIEW ID	34,438
USPCI CELL Y	KNOLLS UT	1,930
USPCI CELL 2	KNOLLS UT	90,883
NA COLITE PROJECT	RIFLE CO	35,488
KENNECOTT LARGE SLIME RESV.	BINGHAM CANYON UT	835,020
UNION OIL CO POND	PARACHUTE CO	173,013
DENVER LAIDLAW LANDFILL	DENVER CO	44,527
NEWMONT MINING NORTH AREA P 3	CARLIN NV	343,410
GOLD STRIKE MINE LINING	CARLIN NV	109,118
OPERATING INDUSTRIES LF	MONTEREY CA	20,000
LA HONDA LOWER RESERVOIR	LA HONDA CA	6,513

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

Rone Intyrath

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NEWMONT NORTH AREA POND	CARLIN	NV	2,702
NEWMONT GOLD SOUT LEACH PAD	CARLIN	NV	138,408
BARRICK GOLDSTRIKE AA POND	ELKO	NV	352
NEWMONT GOLD NON-PROPERTY	CARLIN	NV	539,333
BARRICK NORTH BLOCK PHASE I	CARLIN	NV	2,581,185
BARRICK GOLDSTRIKE NORTH PONDS	CARLIN	NV	6,470
COEUR-ROCHESTER PH II	LOVELOCK	NV	45,380
GOLD STRIKE MINE/BARRICK PH 1A	CARLIN	NV	9,152
BARNEYS CANYON PROJECT	BINGHAM CANYON	UT	22,650
CALABASAS LANDFILL	AGOURA HILLS	CA	550,000
PALM BEACH COUNTY AUTH.	W. PALM BEACH	FL	132,594
STANDARD INDUSTRIES	SAN ANTONIO	TX	12,347
TOWN OF WORTHINGTON	WORTHINGTON	MN	68,554
CHEM WASTE ARAPAHOE	AURORA	CO	57,197
SEVENSON CONSTRUCTION	MODEL CITY	NY	126,192
TURNKEY LANDFILL	DANBURY	NY	102,126
METRO DADE	MIAMI	FL	110,000
GNB RESOURCES	FRISCO	TX	15,000
CITY OF WILLISTON	WILLISTON	SC	327,000
ORLEANS LANDFILL	ROCHESTER	PA	87,048
LANZO CONSTRUCTION	ORLANDO	FL	270,800
HOLLY FARMS	CENTER	TX	17,500
WASTE MANAGEMENT	ERIE	PA	120,080
CECOS	LIVINGSTON	LA	130,000
H.E. SARGENT	DEXTER	ME	150,000
MUSKEGON	WHITEHALL	MI	325,000
SHELLY AND SANDS	SISTERVILLE	WV	34,000
FMC CORPORATION	MINNEAPOLIS	MN	17,500
AMOCO	WOOD RIVER	IL	122,154
CHEMICAL WASTE MANAGEMENT	LAKE CHARLES	LA	55,000
MURNANE ASSOCIATES	CORTLAND	NY	57,258
CHEMICAL WASTE MANAGEMENT	DENVER	CO	75,000
CIBA GEIGY	McINTOSH	AL	62,000
KAB CONSTRUCTION	LAKE CHARLES	LA	90,964
CHEMICAL WASTE MANAGEMENT	EMELLE	AL	193,286
CHEVRON	ROCK SPRINGS	WY	417,885
ALLIED MATERIALS	STROUD	OK	350,000
WOODBURN LANDFILL	SALEM	OR	67,000
FT. LEWIS	FT. LEWIS	WA	105,000
ST. JOHNS LANDFILL	ST. JOHN'S	OR	1,200,000
COFFIN BUTTE LANDFILL	CORVALIS	OR	40,000
MARION COUNTY LANDFILL	WOODBURN	OR	600,000
HILLSBORO LANDFILL	HILLSBORO	OR	600,000
WOMACK INC.	FREEPORT	TX	13,800
GREAT LAKES CONTAINMENT	ST. LOUIS	MO	47,250
ZINC CORP	BARTLESVILLE	OK	65,000
BAILEY SUPERFUND	BRIDGE CITY	TX	495,000
COFFIN BUTTE LANDFILL	CORVALIS	OR	470,553

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

Rone Intyrath

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BEAVER RESERVOIR	GUNNISON	CO	128,010
SHERRCO ASH	BECKER	MN	220,000
BRUNNER LANDFILL	PITTSBURGH	PA	398,732
GASTON COUNTY	GASTON	NC	595,469
ISP	LINDEN	NJ	101,327
HARDIN COUNTY	KOUNTZ	TX	144,655
J.C. ELLIOTT LANDFILL	CORPUS CHRISTI	TX	483,921
SOUTHWEST TANK	DEER PARK	TX	42,000
PHELPS DODGE REFINERY	EL PASO	TX	150,000
COFFIN BUTTE LANDFILL	CORVALLIS	OR	130,000
DRY CREEK PHASE I	MEDFORD	OR	831,012
DRY CREEK PHASE II	MEDFORD	OR	831,000
PREMIUM FARMS IOWA SITE	DES MOINES	IO	427,438
PREMIUM FARMS AHLSTEDT SITE	PLAINVIEW	NE	451,580
PREMIUM FARMS ANSON SITE	NELIGH	NE	491,593
PREMIUM FARMS VANDERSNICK WEST	NELIGH	NE	425,000
BELMONT ASH	INDIANAPOLIS	IN	248,922
MURET GRAIN	BRUNSWICK	NE	418,950
ALTURI LANDFILL	GOSHEN	NY	285,000
NEW HANOVER COUNTY LANDFILL	WILMINGTON	NC	1,570,000
GOULD SUPERFUND SITE	PORTLAND	OR	158,468
COFFIN BUTTE LANDFILL	CORVALLIS	OR	1,059,300
OCEAN COUNTY	LAKEHURST	NJ	12,000
HARDIN COUNTY	KOUNTZ	TX	220,000
ALTURI LANDFILL	GOSHEN	NY	287,000
ROCK PRARIE	COLLEGE STATION	TX	210,000
TRANS JORDAN	SOUTH JORDAN	UT	450,000
PLAINVIEW	PLAINVIEW	TX	530,000
WEST LANDFILL	ANDREWS	TX	145,000
WASCO COUNTY	THE DALLES	OR	450,175
KERR MCGEE	SODA SPRINGS	ID	1,117,703
MCGILL ROAD LANDFILL	JACKSON	MI	220,000
LAKEVIEW	AUSTIN	TX	287,000
EXEL BEEF	PLAINVIEW	TX	110,000
EL CENTRO	ROBSTOWN	TX	469,000
WEYERHAUSER	CASTLE ROCK	WA	450,000
JOHNSTON COUNTY LANDFILL	SMITHVILLE	NC	1,506,844
TRANS JORDAN	SOUTH JORDAN	UT	556,672
PAGEL LANDFILL	ROCKFORD	IL	385,000
CARROLL COUNTY LANDFILL	CARROLL	IA	283,000
LYCOMING CO. LANDFILL	WILLIAMSPORT	PA	972,000
TRANS-ASH	SEMORA	NC	744,000
SOUTHERN PLAINS LANDFILL	ALEX	OK	197,000
KENT COUNTY LANDFILL	GRAND RAPIDS	MI	97,000
PORTSMOUTH NAVAL SHIPYARD	KITTERY	ME	470,000
MILL CREEK LANDFILL	FORT POLK	LA	280,000
KING & QUEEN LANDFILL	LITTLE PLYMOUTH	VA	1,000,000
CITY OF MIDLAND LANDFILL	MIDLAND	TX	460,000

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

Rone Intyrath

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COEUR ROCHESTER	LOVELOCK	NV	120,000
HART CREOSOTE PLANT	JASPER	TX	1,271,000
APEX	SPRINGFIELD	OH	3,200,000
CMS LANDFILL	CONCORD	NC	1,030,000
BRUNSWICK WASTE	LAWRENCEVILLE	VA	230,000
ANDERSON LANDFILL	BELTON	SC	460,000
WASATCH INTEGRATED	SALT LAKE CITY	UT	440,000
PROGRESS ENERGY	ROXBORO	NC	500,000
WASATCH INTEGRATED	LAYTON	UT	4,000,000
SORD LANDFILL	ARDMORE	OK	270,000
WASATCH INTEGRATED	LAYTON	UT	1,000,000

Total Sq. Ft.

59,281,626

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Sommay Intyrath

Page 1

POSITION: Weld Technician / QC Personnel

EXPERIENCE: Has worked on the following projects since 7/23/92

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
CHESAPEAKE CORP SUMP LINERS	FREDERICKSBURG VA	538
TEXAS GULF GYPSUM STACK 3-4	AURORA NC	8,400
ROLLINS ENVIRO ASH/SLUDG	DEER PARK TX	1,582
SAN LUIS CANAL	LOS BANOS CA	133,450
RODMAN LANDFILL	RODMAN NY	35,768
110 SAND PHASE VI	MELVILLE NY	42,500
CAROLINA FOOD PROCESSORS POND	TAR HEEL NC	141,178
CIBA GEIGY CELL 11-13	McINTOSH AL	9,663
PALM BEACH COUNTY LF PH 2	W. PALM BEACH FL	228,369
COAL CREEK PONDS 92 & 94	UNDERWOOD ND	1,490,148
CWM LAKE CHARLES	SULPHUR LA	104,029
CITY OF LUBBOCK	LUBBOCK TX	503,535
CSG REPUBLIC WASTE	AVALON TX	16,665
SOUTHERN PACIFIC TRANSPORTATION	HOUSTON TX	4,640
WESTERN WASTE	CONROE TX	105,880
ENVIROSAFE MANAGEMENT	GRANDVIEW ID	34,438
USPCI CELL Y	KNOLLS UT	1,930
USPCI CELL 2	KNOLLS UT	90,883
NA COLITE PROJECT	RIFLE CO	35,488
UNION OIL CO POND	PARACHUTE CO	173,013
DENVER LAIDLAW LANDFILL	DENVER CO	44,527
GOLD STRIKE MINE LINING	CARLIN NV	109,118
OPERATING INDUSTRIES LF	MONTEREY CA	20,000
LA HONDA LOWER RESERVOIR	LA HONDA CA	6,513
NEWMONT NORTH AREA POND	CARLIN NV	2,702
NEWMONT GOLD SOUT LEACH PAD	CARLIN NV	138,408
BARRICK GOLDSTRIKE AA POND	ELKO NV	352
BARRICK GOLDSTRIKE NORTH PONDS	CARLIN NV	6,470
COEUR-ROCHESTER PH II	LOVELOCK NV	45,380
GOLD STRIKE MINE/BARRICK PH 1A	CARLIN NV	9,152
BARNEYS CANYON PROJECT	BINGHAM CANYON UT	22,650
CALABASAS LANDFILL	AGOURA HILLS CA	163,530

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

Sommay Intyrath

Page 2

PALM BEACH COUNTY AUTH.	W. PALM BEACH	FL	132,594
STANDARD INDUSTRIES	SAN ANTONIO	TX	12,347
ST. JOHN'S LANDFILL	ST. JOHN'S	OR	1,200,000
HILLSBORO LANDFILL	HILLSBORO	OR	600,000
COFFIN BUTTE LANDFILL	CORVALIS	OR	40,000
MARION COUNTY LANDFILL	WOODBURN	OR	600,000
WOMACK INC.	FREEPORT	TX	13,800
GREAT LAKES CONTAIMENT	ST. LOUIS	MO	47,250
ZINC CORP	BARTLESVILLE	OK	65,000
BAILEY SUPERFUND	BRIDGE CITY	TX	425,265
COFFIN BUTTE	CORVALLIS	OR	470,553
BEAVER RESERVOIR	GUNNISON	CO	128,010
SHERRCO ASH	BECKER	MN	220,000
BRUNNER LANDFILL	PITTSBURGH	PA	398,732
GASTON COUNTY	GASTON	NC	595,469
HARDIN COUNTY	KOUNTZ	TX	144,655
J.C. ELLIOTT LANDFILL	CORPUS CHRISTI	TX	483,921
SOUTHWEST TANK	DEER PARK	TX	42,000
PHELPS DODGE REFINERY	EL PASO	TX	150,000
COFFIN BUTTE LANDFILL	CORVALLIS	OR	130,000
PHELPS DODGE REFINERY	EL PASO	TX	150,000
DRY CREEK PHASE II	MEDFORD	OR	831,000
PREMIUM FARMS IOWA SITE	DES MOINES	IO	427,438
PREMIUM FARMS AHLSTEDT SITE	PLAINVIEW	NE	451,580
PREMIUM FARMS ANSON SITE	NELIGH	NE	491,593
PREMIUM FARMS VANDERSNICK WEST	NELIGH	NE	425,000
BELMONT ASH	INDIANAPOLIS	IN	248,922
MURET GRAIN	BRUNSWICK	NE	418,950
ALTURI LANDFILL	GOSHEN	NY	285,000
GOULD SUPERFUND SITE	PORTLAND	OR	158,468
COFFIN BUTTE LANDFILL	CORVALLIS	OR	529,650
EXIDE	FRISCO	TX	140,000
TRANS-ASH	SEMORA	NC	744,000
SOUTHERN PLAINS LANDFILL	ALEX	OK	197,000
KENT COUNTY LANDFILL	GRAND RAPIDS	MI	97,000
PORTSMOUTH NAVAL SHIPYARD	KITTERY	ME	470,000
MILL CREEK LANDFILL	FORT POLK	LA	280,000
KING & QUEEN LANDFILL	LITTLE PLYMOUTH	VA	1,000,000
CITY OF MIDLAND LANDFILL	MIDLAND	TX	460,000
COEUR ROCHESTER	LOVELOCK	NV	120,000
HART CREOSOTE PLANT	JASPER	TX	1,271,000
APEX	SPRINGFIELD	OH	3,200,000
BRUNSWICK WASTE	LAWRENCEVILLE	VA	230,000
WASATCH INTEGRATED	LAYTON	UT	4,000,000
SORD LANDFILL	ARDMORE	OK	270,000
WASATCH INTEGRATED	LAYTON	UT	1,000,000

Total Sq. Ft.

28,488,108

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Sokuntho Nhem

PAGE 1

POSITION: Supervisor

EXPERIENCE: Has worked on the following projects since 07/05/01

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
UVALDE	UVALDE TX	373,911
McGILL ROAD LANDFILL	JACKSON MI	220,000
LAKEVIEW	AUSTIN TX	187,000
EXEL BEEF	PLAINVIEW TX	110,000
OCAEN COUNTY	LAKEHURST NJ	1,800,000
EL CENTRO	ROBSTOWN TX	469,000
JOHNSTON COUNTY LANDFILL	SMITHVILLE NC	1,506,844
TRANS JORDAN LANDFILL	SOUTH JORDAN UT	556,672
PAGEL LANDFILL	ROCKFORD IL	385,000
CARROLL COUNTY LANDFILL	CARROLL IA	283,000
LYCOMING CO. LANDFILL	WILLIAMSPORT PA	972,000
TRANS-ASH	SEMORA NC	744,000
SOUTHERN PLAINS LANDFILL	ALEX OK	197,000
FMC	FRONT ROYAL VA	330,000
WEYHAUSER	CASTE ROCK WA	600,000
MANN LANDFILL	WEST POINT VA	320,000
INTERNATIONAL PAPER	FRANKLIN VA	370,000
C&P LANDFILL	LINCOLN NE	210,000
MILL CREEK LANDFILL	FORT POLK LA	28,000
TRANS-JORDAN	SALT LAKE CITY UT	500,000
COUER ROCHESTER	LOVE LOCK NV	1,100,000
ANDERSON LANDFILL	BELTON SC	497,000
INTERNATIONAL PAPER	MANSFIELD LA	650,000
KING & QUEEN LANDFILL	LITTLE PLYMOUTH VA	1,000,000
CITY OF MIDLAND LANDFILL	MIDLAND TX	460,000
COUER ROCHESTER	LOVE LOCK NV	120,000
HART CREOSOTE PLANT	JASPER TX	1,271,000
APEX	SPRINGFIELD OH	3,200,000
LEE COUNTY LANDFILL	BISHOPVILLE SC	412,907
BRUNSWICK WASTE	LAWRENCEVILLE VA	230,000
WASATCH INTEGRATED	LAYTON UT	4,000,000
SORD LANDFILL	ARDMORE OK	270,000
WASATCH INTEGRATED	LAYTON UT	1,000,000

Total Sq. Ft.

24,373,334

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Efren Rostro

PAGE 1

POSITION: Technician in Training

EXPERIENCE: Has worked on the following projects since 09/06/02

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
LYCOMING CO. LANDFILL	WILLIAMSPORT PA	972,000
MANN LANDFILL	WEST POINT VA	320,000
INTERNATIONAL PAPER	FRANKLIN VA	370,000
HONEYWELL HANLIN ALLIED SITE	MOUNDSVILLE WV	350,000
ALCOA	VANCOUVER WA	420,000
KING & QUEEN LANDFILL	LITTLE PLYMOUTH VA	1,000,000
CITY OF MIDLAND LANDFILL	MIDLAND TX	460,000
COUER ROCHESTER	LOVE LOCK NV	120,000
LEE COUNTY LANDFILL	BISHOPVILLE SC	412,907
THREE RIVERS LANDFILL	AIKEN SC	2,700,000
LEE COUNTY LANDFILL	BISHOPVILLE SC	412,907
PROGRESS ENERGY	ROXBORO NC	500,000
WASATCH INTEGRATED	SALT LAKE CITY UT	440,000

Total Sq. Ft.

8,477,814

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Silviano Bastida

PAGE 1

POSITION: Field Technician

EXPERIENCE: Has worked on the following projects since 10/29/04

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
OCEAN COUNTY LANDFILL	LAKEHURST NJ	1,700,000
SHAW ROAD - ALCOA	LEIGHTON AL	5,500,000
KING & QUEEN LANDFILL	LITTLE PLYMOUTH VA	1,000,000
LOUDOUN COUNTY LANDFILL	LEESBURG VA	1,650,000
THREE RIVERS LANDFILL	AIKEN SC	2,700,000
OKLAHOMA CITY LANDFILL	OKLAHOMA CITY OK	24,462
THREE RIVERS LANDFILL	AIKEN SC	300,000
CLOVER POWER STATION	SOUTH BOSTON VA	1,200,000

Total Sq. Ft.

14,074,462

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Silvia Nava

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 7/05/06

<u>PROJECT</u>	<u>LOCATION</u>		<u>SQ FT</u>
WASATCH INTEGRATED	LAYTON	UT	4,000,000
SORD LANDFILL	ARDMORE	OK	270,000
WASATCH INTEGRATED	LAYTON	UT	1,000,000
Total Sq. Ft.			5,270,000

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Lorenzo Morales

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 01/08/07

PROJECT

LOCATION

SQ FT

Total Sq. Ft.

-

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Victor Martinez

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 02/14/07

PROJECT

LOCATION

SQ FT

Total Sq. Ft.

-

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Gustavo Gonzalez

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 06/12/07

PROJECT

LOCATION

SQ FT

Total Sq. Ft.

-

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Heriberto Bastida

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 06/12/07

PROJECT

LOCATION

SQ FT

Total Sq. Ft.

-

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Antonio Ramirez

PAGE 1

POSITION: Technician

EXPERIENCE: Has worked on the following projects since 07/01/02

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
LYCOMING CO. LANDFILL	WILLIAMS PORT PA	972,000
OCEAN CO. LANDFILL	LAKEHURST NJ	542,000
TRANS JORDAN	SOUTH JORDAN UT	556,672
PAGEL LANDFILL	ROCKFORD IL	385,000
CARROLL CO. LANDFILL	CARROLL IA	283,000
FMC	LYNCHBURGH VA	422,000
TRANS-ASH	SEMORA NC	744,000
SOUTHERN PLAINS LANDFILL	ALEX OK	197,000
FMC	FRONT ROYAL VA	330,000
MANN LANDFILL	WEST POINT VA	320,000
INTERNATIONAL PAPER	FRANKLIN VA	370,000
HART CREOSOTE PLANT	JASPER TX	1,271,000
APEX	SPRINGFIELD OH	3,200,000
BRUNSWICK WASTE	LAWRENCEVILLE VA	230,000
ANDERSON LANDFILL	BELTON SC	183,724
WASATCH INTEGRATED	LAYTON UT	4,000,000
SORD LANDFILL	ARDMORE OK	270,000
WASATCH INTEGRATED	LAYTON UT	1,000,000

Total Sq. Ft.

15,276,396

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Roberto Hernandez

PAGE 1

POSITION: Field Technician

EXPERIENCE: Has worked on the following projects since 5/16/05

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
COASTAL PLAINS LANDFILL	ALVIN TX	280,000
LEE COUNTY LANDFILL	BISHOPVILLE SC	412,907
THREE RIVERS LANDFILL	AIKEN SC	2,700,000
OKLAHOMA CITY LANDFILL	OKLAHOMA CITY OK	24,462
LEE COUNTY LANDFILL	BISHOPVILLE SC	412,907

Total Sq. Ft.

3,830,276

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Carmelo Hernandez

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 08/13/06

<u>PROJECT</u>	<u>LOCATION</u>		<u>SQ FT</u>
WASATCH INTEGRATED	LAYTON	UT	1,000,000

Total Sq. Ft.

1,000,000

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Juan Garcia

PAGE 1

POSITION: Weld Technician in Training

EXPERIENCE: Has worked on the following projects since 07/18/01

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
McGILL ROAD LANDFILL	JACKSON MI	220,000
LAKEVIEW	AUSTIN TX	287,000
EXEL BEEF	PLAINVIEW TX	110,000
OCEAN COUNTY	LAKEHURST NJ	1,800,000
EL CENTRO	ROBSTOWN TX	469,000
JOHNSTON CO. LANDFILL	SMITHVILLE NC	600,000
OCEAN COUNTY	LAKEHURST NJ	410,000
BRAZORIA CO. LANDFILL	ANGLETON TX	239,770
OCEAN COUNTY	LAKEHURST NJ	281,075
KENT COUNTY LANDFILL	GRAND RAPIDS MI	240,000
JOHNSTON CO. LANDFILL	SMITHVILLE NC	1,506,844
LYCOMING CO. LANDFILL	WILLIAMSPORT PA	972,000
OCEAN COUNTY	LAKEHURST NJ	542,000
FMC	LYNCHBURG VA	422,000
MANN LANDFILL	WEST POINT VA	320,000
INTERNATIONAL PAPER	FRANKLIN VA	370,000
HONEYWELL HANLIN ALLIED SITE	MOUNDSVILLE WV	350,000
ALCOA	VANCOUVER WA	420,000
CITY OF MIDLAND LANDFILL	MIDLAND TX	460,000
COEUR ROCHESTER	LOVELOCK NV	120,000
HART CREOSOTE PLANT	JASPER TX	1,271,000
BRUNSWICK WASTE	LAWRENCEVILLE VA	230,000
WASATCH INTEGRATED	LAYTON UT	4,000,000
SORD LANDFILL	ARDMORE OK	270,000
WASATCH INTEGRATED	LAYTON UT	1,000,000
Total Sq. Ft.		16,910,689

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Abelino Garcia

PAGE 1

POSITION: Field Tech

EXPERIENCE: Has worked on the following projects since 04/8/05

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
LOUDOUN COUNTY LANDFILL	LEESBURG VA	1,650,000
CITY OF MIDLAND LANDFILL	MIDLAND TX	460,000
COASTAL PLAINS LANDFILL	ALVIN TX	280,000
G&P LANDFILL	MILFORD NE	490,000
HART CREOSOTE PLANT	JASPER TX	1,271,000
APEX	SPRINGFIELD OH	3,200,000
CMS LANDFILL	CONCORD SC	1,030,000
BRUNSWICK WASTE	LAWRENCEVILLE VA	230,000
ANDERSON LANDFILL	BELTON SC	183,724
WASATCH INTEGRATED	LAYTON UT	4,000,000
SORD LANDFILL	ARDMORE OK	270,000
WASATCH INTEGRATED	LAYTON UT	1,000,000

Total Sq. Ft.

12,794,724

Texas Environmental Plastics, Ltd.

Installers, Fabricators & Distributors of Environmental Lining Systems

RESUME

NAME: Uriel Bastida

PAGE 1

POSITION: New Hire

EXPERIENCE: Has worked on the following projects since 01/10/05

<u>PROJECT</u>	<u>LOCATION</u>	<u>SQ FT</u>
SHAW ROAD - ALCOA	LEIGHTON AL	5,500,000
LOUDOUN COUNTY LANDFILL	LEESBURG VA	1,650,000
THREE RIVERS LANDFILL	AIKEN SC	2,700,000
OKLAHOMA CITY LANDFILL	OKLAHOMA CITY OK	24,462
CMS LANDFILL	CONCORD NC	392,000
FALL RIVER LANDFILL	FALL RIVER MA	224,689

Total Sq. Ft.

10,491,151

APPENDIX H
GEOSYNTHETIC CLAY LINER MANUFACTURER'S
QC CERTIFICATES



Date: 12/30/2008
Purchase Order:
ORDER NUMBER: 024723328

Jeff Shepherd
Waste Management
100 Two Pine Drive
North Little Rock, AR 72117
jashepherd@sedcousa.net

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Waste Management.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roger B. Wilkerson', is written over a horizontal line.

Roger B. Wilkerson
Quality Assurance Coordinator
CETCO Lovell Plant



**GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME: ECO Vista LF
CUSTOMER P.O.:
ORDER NUMBER: 024723328
PREPARED FOR: Waste Management

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Roger B. Wilkerson
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, WY 82431

Telephone: 800-322-1149 ext. 413
Fax:
E-Mail: rwilke@cetco.com



PRODUCTION CERTIFICATION

PROJECT NAME: ECO Vista LF
CUSTOMER P.O.:
PREPARED FOR: Waste Management

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION PROCEDURE

CETCO hereby affirms that all Bentomat[®] geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat[®] to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

A handwritten signature in black ink, appearing to read "Roger B. Wilkerson", is positioned above the printed name.

Roger B. Wilkerson
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)



Ship Date: 12/29/2008

Order Number: 024723328

Prepared For: Waste Management

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties listed in the tables below.

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT SDN

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D 5891	Bentonite Fluid Loss	1 per 50 Tons	18 ml Max
ASTM D 5993	Bentonite Mass/Area	40,000 sq ft (4000 sq m)	0.75 lb /sq ft (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	30 lbs/in MARV
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10 ⁻⁹ cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10 ⁻⁸ m ³ /m ² /sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	2.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT SDN

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4643	GCL Moisture	Standard	40% Max	Standard

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility.

All tensile testing is in the machine direction.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT SDN

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd ²
Bentomat SDN Base Nonwoven Fabric	ASTM D 5261	2.7	oz/yd ²

Fabric certifications from our raw material suppliers are on file at our production facility.



CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Roger B. Wilkerson
Quality Assurance Coordinator
CETCO Lovell Plant



GCL ORDER PACKING LIST

GCL shipped for certification package number 024723328

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024723328	LO-BENTOMAT SDN	200851LO	00002037	150	14.5	2175	2640
024723328	LO-BENTOMAT SDN	200851LO	00002156	150	14.5	2175	2630
024723328	LO-BENTOMAT SDN	200851LO	00002157	150	14.5	2175	2575
024723328	LO-BENTOMAT SDN	200851LO	00002158	150	14.5	2175	2690
024723328	LO-BENTOMAT SDN	200851LO	00002212	150	14.5	2175	2650
024723328	LO-BENTOMAT SDN	200851LO	00002214	150	14.5	2175	2645
024723328	LO-BENTOMAT SDN	200851LO	00002216	150	14.5	2175	2640
024723328	LO-BENTOMAT SDN	200851LO	00002221	150	14.5	2175	2625
024723328	LO-BENTOMAT SDN	200851LO	00002242	150	14.5	2175	2635
024723328	LO-BENTOMAT SDN	200851LO	00002253	150	14.5	2175	2600
024723328	LO-BENTOMAT SDN	200851LO	00002254	150	14.5	2175	2625
024723328	LO-BENTOMAT SDN	200851LO	00002279	150	14.5	2175	2625
024723328	LO-BENTOMAT SDN	200851LO	00002289	150	14.5	2175	2630
024723328	LO-BENTOMAT SDN	200851LO	00002311	150	14.5	2175	2515
024723328	LO-BENTOMAT SDN	200851LO	00002312	150	14.5	2175	2445
024723328	LO-BENTOMAT SDN	200851LO	00002472	150	14.5	2175	2645
024723328	LO-BENTOMAT SDN	200851LO	00002477	150	14.5	2175	2640
Totals:				2550	246.5	36975	44455
Total Number of Rolls Certified: 17							

Use these roll numbers
for the ones taken from
Eco Vista.



GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024723328

GCL			Geotextiles			Clay	
LO-BENTOMAT SDN			LO-N/W-WHITE-DN LW			LO-N/W-BLK-DNLW-2.7	
GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200851LO	00002037	00002033	2010914995			2010669810	110808A
200851LO	00002156	00002154	2010915318			2010664138	110908C
200851LO	00002157	00002154	2010915318			2010664138	110908C
200851LO	00002158	00002154	2010755809			2010664138	110908C
200851LO	00002212	00002208	2010820808			2010636604	110908D
200851LO	00002214	00002208	2010820808			2010636604	110908D
200851LO	00002216	00002208	2010820808			2010636604	110908D
200851LO	00002221	00002208	2010858261			2010636613	111008A
200851LO	00002242	00002226	2010902630			2010636613	111008A
200851LO	00002253	00002244	2010858226			2010496441	111008A
200851LO	00002254	00002244	2010858226			2010496441	111008A
200851LO	00002279	00002262	2010905872			2010636619	111008B
200851LO	00002289	00002280	2010915316			2010636616	111008B
200851LO	00002311	00002298	2010820857			2010636591	111108A
200851LO	00002312	00002312	2010820857			121708NWA	111108A
200851LO	00002472	00002460	2010905862			2009538997	111108D
200851LO	00002477	00002460	2010914999			2009538997	111108D



GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024723328 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
Standard Test Method:			ASTM D 5993	ASTM D 6768	ASTM D 6496
Standard Specification:			0.75 lb/sq ft MARV	30lbs/in MARV	2.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attached property sheet					
LO-BENTOMAT SDN	200851LO	00002033	0.91	33.1	5.8
LO-BENTOMAT SDN	200851LO	00002154	0.85	30.3	3.9
LO-BENTOMAT SDN	200851LO	00002208	0.90	30.0	7.1
LO-BENTOMAT SDN	200851LO	00002226	0.90	30.0	6.9
LO-BENTOMAT SDN	200851LO	00002244	0.85	30.0	9.1
LO-BENTOMAT SDN	200851LO	00002262	0.85	35.1	9
LO-BENTOMAT SDN	200851LO	00002280	0.85	35.1	6.1
LO-BENTOMAT SDN	200851LO	00002298	0.85	35.1	6.8
LO-BENTOMAT SDN	200851LO	00002312	0.85	30.0	4.7
LO-BENTOMAT SDN	200851LO	00002460	0.89	37.5	7

Product	Lot # Tested	Roll # Tested	Moisture	GRAB 4632
LO-BENTOMAT SDN	200851LO	00002033	26.4	132.7
LO-BENTOMAT SDN	200851LO	00002154	23.9	121.3
LO-BENTOMAT SDN	200851LO	00002208	24.6	115.8
LO-BENTOMAT SDN	200851LO	00002226	25.7	115.8
LO-BENTOMAT SDN	200851LO	00002244	26.2	115.8
LO-BENTOMAT SDN	200851LO	00002262	28.3	140.5
LO-BENTOMAT SDN	200851LO	00002280	23.8	140.5
LO-BENTOMAT SDN	200851LO	00002298	26.4	140.5
LO-BENTOMAT SDN	200851LO	00002312	27.4	119.1
LO-BENTOMAT SDN	200851LO	00002460	26.6	149.8

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.



BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024723328 has been tested by American Colloid Company and yielded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
110808A	11.2	26.0	16.0
110908C	10.4	25.0	15.0
110908D	11.6	26.0	14.0
111008A	12.0	28.0	15.2
111008B	12.0	29.0	15.8
111108A	12.0	28.0	16.2
111108D	11.2	27.0	15.4



GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024723328 was manufactured with geotextiles which were tested with the following results.

BASE			
Material	Roll Number	Mass Area oz/yd ²	Grab Strength lbs
PT	121708NWA	3.8	88.0
PPX 311	2009538997	3.6	103.9
PPX 311	2010496441	3.1	68.6
PPX 311	2010636591	3.7	89.2
PPX 311	2010636604	3.3	73.6
PPX 311	2010636613	4.0	88.7
PPX 311	2010636616	3.7	89.9
PPX 311	2010636619	3.4	75.0
PPX 311	2010664138	3.6	87.0
PPX 311	2010669810	3.9	99.3
CAP			
Material	Roll Number	Mass Area oz/yd ²	Grab Strength lbs
PPX 650	2010755809	7.4	61.7
PPX 650	2010820808	7.1	49.8
PPX 650	2010820857	7.2	48.9
PPX 650	2010858226	7.7	56.0
PPX 650	2010858261	7.2	63.9
PPX 650	2010902630	8.1	55.1
PPX 650	2010905862	7.9	67.1
PPX 650	2010905872	7.4	64.9
PPX 650	2010914995	8.1	55.6
PPX 650	2010914999	6.9	46.9
PPX 650	2010915316	7.6	72.4
PPX 650	2010915318	7.6	72.4

Certifications from our suppliers are on file at our production facility. An '*' or 'PT' indicates supplier certifications were unavailable prior to shipping so testing was performed at a CETCO lab.

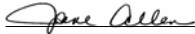
APPENDIX I
GEOMEMBRANE MANUFACTURER'S QC
CERTIFICATES



Roll Test Data Report

Sales Order No.	Project Number	Customer Name	Project Location	Product Name		Report Date
56426	526110	GSE Installation	North Little Rock, AR	HDT060VW00		7/17/2009

Roll No.	ASTM D 5994				ASTM D638, Type IV / D6693						ASTM D 1004		ASTM D 4833	ASTM D 1505	ASTM D 4218/1603	ASTM D 5596	GRI GM 12	
	Average	Minimum	TD Strength	MD Strength	TD Strength	MD Strength	TD Elongation	MD Elongation	TD Elongation	MD Elongation	TD Tear	MD Tear	Puncture		Carbon Black	Carbon Black	Asperity Height	Asperity Height
	Thickness	Thickness	@ Yield	@ Yield	@ Break	@ Break	@ Yield	@ Yield	@ Break	@ Break	Resistance	Resistance	Resistance	Density	Content	Dispersion	Side A	Side B
	(mils)	(mils)	(ppi)	(ppi)	(ppi)	(ppi)	(%)	(%)	(%)	(%)	(lbs)	(lbs)	(lbs)	(g/cc)	(%)	Views in Cat1 - Cat2	(mils)	(mils)
	every roll					every 4th					every 4th		every 4th	every 4th	every 4th	every 4th	every 2nd	
108135636	65	59	183	175	192	214	15	17	464	497	59	64	156	0.945	2.47	10	24	25
108135637	64	58	183	175	192	214	15	17	464	497	59	64	156	0.945	2.47	10	24	25
108135638	63	58	174	172	179	188	15	17	415	404	60	61	161	0.945	2.31	10	25	25
108135639	64	58	174	172	179	188	15	17	415	404	60	61	161	0.945	2.31	10	25	25
108135640	64	58	174	172	179	188	15	17	415	404	60	61	161	0.945	2.31	10	24	25
108135641	64	58	174	172	179	188	15	17	415	404	60	61	161	0.945	2.31	10	24	25
108135642	64	58	182	186	189	217	15	15	468	490	58	64	164	0.945	2.43	10	26	25
108135643	64	58	182	186	189	217	15	15	468	490	58	64	164	0.945	2.43	10	26	25
108135644	64	58	182	186	189	217	15	15	468	490	58	64	164	0.945	2.43	10	24	23
108135645	63	58	182	186	189	217	15	15	468	490	58	64	164	0.945	2.43	10	24	23
108135646	64	58	184	175	180	208	15	17	401	467	59	62	157	0.946	2.39	10	25	26
108135647	64	58	184	175	180	208	15	17	401	467	59	62	157	0.946	2.39	10	25	26
108135648	64	58	184	175	180	208	15	17	401	467	59	62	157	0.946	2.39	10	24	24
108135649	63	58	184	175	180	208	15	17	401	467	59	62	157	0.946	2.39	10	24	24
108135650	62	57	175	170	170	178	16	15	394	292	57	60	153	0.945	2.45	10	24	24
108135651	62	58	175	170	170	178	16	15	394	292	57	60	153	0.945	2.45	10	24	24
108135652	63	57	175	170	170	178	16	15	394	292	57	60	153	0.945	2.45	10	25	24
108135653	63	57	175	170	170	178	16	15	394	292	57	60	153	0.945	2.45	10	25	24
108135654	63	58	183	170	183	214	15	17	383	499	58	60	156	0.945	2.36	10	26	25
108135655	63	58	183	170	183	214	15	17	383	499	58	60	156	0.945	2.36	10	26	25
108135656	63	58	183	170	183	214	15	17	383	499	58	60	156	0.945	2.36	10	26	25
108135657	63	58	183	170	183	214	15	17	383	499	58	60	156	0.945	2.36	10	26	25
108135659	64	58	192	190	210	230	15	15	510	508	59	62	160	0.944	2.26	10	25	24
108135660	64	58	192	190	210	230	15	15	510	508	59	62	160	0.944	2.26	10	26	23
108135661	65	57	192	190	210	230	15	15	510	508	59	62	160	0.944	2.26	10	26	23
108135662	65	58	184	186	177	218	15	16	361	494	60	63	159	0.944	2.45	10	24	24
108135663	65	58	184	186	177	218	15	16	361	494	60	63	159	0.944	2.45	10	24	24
108135664	65	58	184	186	177	218	15	16	361	494	60	63	159	0.944	2.45	10	24	23
108135665	65	58	184	186	177	218	15	16	361	494	60	63	159	0.944	2.45	10	24	23
108135666	64	59	164	165	180	195	15	16	501	493	54	56	143	0.945	2.28	10	23	23
108135667	64	60	164	165	180	195	15	16	501	493	54	56	143	0.945	2.28	10	23	23
108135668	62	59	164	165	180	195	15	16	501	493	54	56	143	0.945	2.28	10	23	23

Laboratory Manager: 

GSE-8.2.4-029 Rev -- 03/05

This test report shall not be reproduced, except in full, without written approval of the laboratory.

19103 Gundle Road - Houston, Texas 77073

GSE Roll Allocation

Order 56426
Customer GSE Installation
Site WMI Two Pine Landfill Cell

<i>Roll#</i>	<i>Resin Lot</i>	<i>Product Code</i>	<i>Description</i>	<i>Mfg. Date</i>	<i>Length</i>
108135636	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135637	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135638	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135639	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135640	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135641	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135642	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135643	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135644	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135645	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135646	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135647	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135648	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135649	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135650	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135651	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135652	8290224	HDT060VW00	HDT060VW00	7/15/2009	520
108135653	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135654	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135655	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135656	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135657	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135659	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135660	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135661	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135662	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135663	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135664	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135665	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135666	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135667	8290224	HDT060VW00	HDT060VW00	7/16/2009	520
108135668	8290224	HDT060VW00	HDT060VW00	7/16/2009	520



Report Date
7/20/2009

Quality Assurance Laboratory Test Results

Job Name: WMI Two Pine Landfill Cell
Sales Order: 56426

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry

Custom Frequency: 1/200,000 lbs.

Custom Criteria: 140 minutes

Product Code	Resin Lot Number	Test Results
HDT060VW00	8290224	PASS

Approved By: Debra Gortemiller
Date Approved: July 16, 2009

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.



Report Date
7/20/2009

Quality Assurance Laboratory Test Results

Job Name: WMI Two Pine Landfill Cell
Sales Order: 56426

Required Testing: ASTM D 5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Custom Frequency: 1/Resin Lot

Custom Criteria: 1000 hours

Product Code	Resin Lot Number	Test Results
HDT060VW00	8290224	PASS

Approved By: Debra Gortemiller
Date Approved: July 16, 2009

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.



Quality Assurance Laboratory Test Results

Job Name: WMI Two Pine Landfill Cell
SO Number: 56426

The table below summarizes additive performance of GSE Houston products as perceived by OIT retention after Oven and UV Aging per GRI Test Method GM13:

Product Type	Formulation	Oven Aging @ 85° C (ASTM D 5721)				UV Resistance per GRI GM11			
		90 days per ASTM D 3895				1600 hours UV Aging per ASTM D 5885			
		Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)	Initial HP OIT (min)	Final HP OIT (min)	Retained (%)	GRI Criteria (%)
HDPE Geomembrane	Chevron Phillips Marlex® K306 + Carbon Black	697	661	94	80	697	565	81	50

Approved By: Debra Gortemiller
Date: July 16, 2009

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Certificate of Analysis

Shipped To: CHEVRON PHILLIPS CHEM. CO LP: GSE
19103 GUNDLE ROAD
WESTFIELD TX 77090
USA

CPC Delivery #: 87875729
PO #: 46822
Weight: 191000 LB
Ship Date: 06/19/2009
Package: BULK
Mode: Hopper Car
Car #: CPCX805052
Seal No: 260299

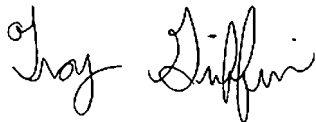
Recipient: UP TRACK 14732 Phouangsavanh
Fax:

Product:
MARLEX POLYETHYLENE K306 BULK

Lot Number: 8290224

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.1	g/10mi
HLMI Flow Rate	ASTM D1238	11.8	g/10mi
Density	ASTM D1505	0.937	g/cm3
Production Date		05/31/2009	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP.
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at 800-231-1212

APPENDIX J

GEOMEMBRANE CONFORMANCE TEST RESULTS



July 22, 2009

Mail To:

Mr. David Conrad
Waste Management, Inc.

Bill To:

<= Same

email: dconrad@wm.com
ccemail: bnfutureigh@terracon.com

Dear Mr. Conrad:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Two Pines
TRI Job Reference Number:	E2330-73-09
Material(s) Tested:	1 GSE 60 mil Textured HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Content (ASTM D 4218) Carbon Dispersion (ASTM D 5596) Tensile (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager



GEOMEMBRANE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pines

Material: GSE 60 mil Textured HDPE Geomembrane

Sample Identification: 108135636

TRI Log #: E2330-73-09

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	69	62	64	63	64	70	72	68	69	67	67 62	3 << min	60 avg 57 min
Density (ASTM D 1505)													
Density (g/cm3)	0.945	0.946	0.946								0.946	0.001	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.45	2.47									2.46	0.01	2 - 3%
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	2	1	2								Cat 1, 2
Rating - 2nd field view	1	2	2	1	1								Cat 1, 2
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	201	190	198	210	190						198	8	126 min
TD Yield Strength (ppi)	205	192	198	190	194						196	6	126 min
MD Break Strength (ppi)	236	221	233	218	218						225	9	126 min
TD Break Strength (ppi)	154	185	151	170	165						165	14	126 min
MD Yield Elongation (%)	17	17	19	19	17						18	1	12 min
TD Yield Elongation (%)	17	16	19	17	17						17	1	12 min
MD Break Elongation (%)	529	525	543	468	499						513	30	100 min
TD Break Elongation (%)	108	434	171	418	414						309	156	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	166	165	169	168	159						165	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	68	70	71	76	64	67	65	71	67	70	69	3	42 min
TD Tear Strength (lbs)	62	71	66	70	66	64	64	64	69	62	66	3	42 min
MD Machine Direction	TD Transverse Direction												

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



July 29, 2009

Mail To:

Mr. David Conrad
Waste Management, Inc.

email: dconrad@wm.com
ccemail: bnfutureigh@terracon.com

Bill To:

<= Same

Dear Mr. Conrad:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Two Pines
TRI Job Reference Number:	E2330-86-02
Material(s) Tested:	4 GSE 60 mil Textured HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Content (ASTM D 4218) Carbon Dispersion (ASTM D 5596) Tensile (ASTM D 6693) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager



GEOMEMBRANE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pines

Material: GSE 60 mil Textured HDPE Geomembrane

Sample Identification: 108135644

TRI Log #: E2330-86-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	64	62	66	67	61	65	67	65	67	66	65 61	2 << min	60 avg 57 min
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								0.947	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.61	2.58									2.60	0.02	2 - 3%
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								Cat 1, 2
Rating - 2nd field view	1	1	1	1	2								Cat 1, 2
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	190	183	195	194	186						190	5	126 min
TD Yield Strength (ppi)	217	216	200	209	201						209	8	126 min
MD Break Strength (ppi)	202	223	147	214	162						190	33	126 min
TD Break Strength (ppi)	158	163	149	156	165						158	6	126 min
MD Yield Elongation (%)	19	17	17	17	19						18	1	12 min
TD Yield Elongation (%)	17	16	16	21	21						18	3	12 min
MD Break Elongation (%)	454	558	260	484	403						432	111	100 min
TD Break Elongation (%)	333	391	121	283	424						310	119	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	154	156	153	147	149						152	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	59	64	64	63	64	67	68	70	63	64	65	3	42 min
TD Tear Strength (lbs)	59	62	60	62	59	63	65	64	60	60	61	2	42 min
MD Machine Direction	TD Transverse Direction												

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



GEOMEMBRANE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pines

Material: GSE 60 mil Textured HDPE Geomembrane

Sample Identification: 108135652

TRI Log #: E2330-86-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	67	65	68	66	63	67	65	62	67	65 62	2 << min	60 avg 57 min
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.53	2.51									2.52	0.01	2 - 3%
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								Cat 1, 2
Rating - 2nd field view	2	1	1	1	2								Cat 1, 2
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	194	197	197	180	192						192	7	126 min
TD Yield Strength (ppi)	206	203	210	201	201						204	4	126 min
MD Break Strength (ppi)	227	215	225	212	156						207	29	126 min
TD Break Strength (ppi)	201	158	208	144	199						182	29	126 min
MD Yield Elongation (%)	17	17	17	17	21						18	2	12 min
TD Yield Elongation (%)	17	17	17	17	17						17	0	12 min
MD Break Elongation (%)	515	479	514	520	330						472	81	100 min
TD Break Elongation (%)	450	111	470	184	459						335	173	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	168	157	160	159	162						161	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	66	65	62	65	61	65	63	66	64	63	64	2	42 min
TD Tear Strength (lbs)	62	62	61	64	60	59	64	61	61	63	62	2	42 min
MD Machine Direction	TD Transverse Direction												

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



GEOMEMBRANE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pines

Material: GSE 60 mil Textured HDPE Geomembrane

Sample Identification: 108135661

TRI Log #: E2330-86-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	64	67	66	67	64	63	68	66	64	66	66 63	2 << min	60 avg 57 min
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.55	2.58									2.57	0.02	2 - 3%
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	2	1	1	1								Cat 1, 2
Rating - 2nd field view	1	1	1	1	1								Cat 1, 2
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	179	184	181	180	191						183	5	126 min
TD Yield Strength (ppi)	189	183	175	195	183						185	7	126 min
MD Break Strength (ppi)	187	213	215	199	222						207	14	126 min
TD Break Strength (ppi)	201	137	199	184	215						187	30	126 min
MD Yield Elongation (%)	17	17	18	17	18						17	1	12 min
TD Yield Elongation (%)	17	17	17	16	17						17	0	12 min
MD Break Elongation (%)	426	494	516	453	506						479	38	100 min
TD Break Elongation (%)	500	194	515	433	563						441	146	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	163	159	155	155	163						159	4	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	61	64	61	61	61	65	60	65	63	62	62	2	42 min
TD Tear Strength (lbs)	61	60	62	61	60	60	60	61	59	59	60	1	42 min
MD Machine Direction	TD Transverse Direction												

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



GEOMEMBRANE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pines

Material: GSE 60 mil Textured HDPE Geomembrane

Sample Identification: 108135668

TRI Log #: E2330-86-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	65	65	64	64	57	63	66	67	64	66	64 57	3 << min	60 avg 57 min
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.55	2.52									2.54	0.02	2 - 3%
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								Cat 1, 2
Rating - 2nd field view	1	2	1	1	1								Cat 1, 2
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	178	186	192	188	173						183	8	126 min
TD Yield Strength (ppi)	204	209	197	193	201						201	6	126 min
MD Break Strength (ppi)	194	209	200	198	155						191	21	126 min
TD Break Strength (ppi)	213	215	208	153	211						200	26	126 min
MD Yield Elongation (%)	19	18	18	18	16						18	1	12 min
TD Yield Elongation (%)	17	17	17	17	17						17	0	12 min
MD Break Elongation (%)	449	483	435	448	258						414	89	100 min
TD Break Elongation (%)	499	493	509	275	496						454	100	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	156	161	162	161	158						160	3	90 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	62	63	64	67	65	64	65	64	64	63	64	1	42 min
TD Tear Strength (lbs)	60	60	64	61	63	62	57	61	62	61	61	2	42 min
MD Machine Direction	TD Transverse Direction												

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

APPENDIX K

GEOSYNTHETICS INVENTORY LISTING

Geosynthetics Inventory



Terracon Project No: 35097116

25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Manufacturer: GSE

Contractor: Grayco

Transportation: Truck

Project Name: Two Pine - Cell 3

Date of Arrival: 8/3/09

Address: Two Pine Class 1 Landfill

Material Type: 60T

Location: North Little Rock, Arkansas

Condition of Material: Good

ROLL COUNT	ROLL NUMBER	RESIN OR LOT NO.	MATERIAL DIMENSIONS				QC/QA CERT.	CONF. SAMPLE	REMARKS
			LENGTH (FEET)	WIDTH (FEET)	SQUARE FEET	THICK (MILLS)			
1	108135636	8290224	520	22.5	11,700	67	JWS	YES	PASSED
2	108135637	8290224	520	22.5	11,700		JWS		
3	108135643	8290224	520	22.5	11,700		JWS		
4	108135646	8290224	520	22.5	11,700		JWS		
5	108135647	8290224	520	22.5	11,700		JWS		
6	108135648	8290224	520	22.5	11,700		JWS		
7	108135649	8290224	520	22.5	11,700		JWS		
8	108135650	8290224	520	22.5	11,700		JWS		
9	108135651	8290224	520	22.5	11,700		JWS		
10	108135652	8290224	520	22.5	11,700	65	JWS	YES	PASSED
11	108135653	8290224	520	22.5	11,700		JWS		
12	108135654	8290224	520	22.5	11,700		JWS		
13	108135657	8290224	520	22.5	11,700		JWS		
14	108135659	8290224	520	22.5	11,700		JWS		
15	108135660	8290224	520	22.5	11,700		JWS		
16	108135661	8290224	520	22.5	11,700	66	JWS	YES	PASSED
17	108135662	8290224	520	22.5	11,700		JWS		
18	108135663	8290224	520	22.5	11,700		JWS		
19	108135664	8290224	520	22.5	11,700		JWS		
20	108135667	8290224	520	22.5	11,700		JWS		
21	108135668	8290224	520	22.5	11,700	64	JWS	YES	PASSED
22	108135638	8290224	520	22.5	11,700		JWS		
23	108135639	8290224	520	22.5	11,700		JWS		
24	108135640	8290224	520	22.5	11,700		JWS		
25	108135641	8290224	520	22.5	11,700		JWS		

TOTAL THIS PAGE: 292,500 ft²
TOTAL ACCUMULATED: 292,500 ft²

Material Type Legend:

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Terracon

**25809 Interstate 30 South
Bryant, AR 72022
Phone: 501.847.9292
Fax: 501.847.9210**

Manufacturer:	GSE
Transportation:	Truck
Date of Arrival:	8/3/09
Material Type:	60T
Condition of Material:	Good

TOTAL THIS PAGE: 81,900 ft²
TOTAL ACCUMULATED: 374,400 ft²

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Geosynthetics Inventory



Terracon Project No: 35097116

25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Manufacturer: SKAPS

Contractor: Grayco

Transportation: Truck

Project Name: Two Pine - Cell 3

Date of Arrival: 8/5/09

Address: Two Pine Class 1 Landfill

Material Type: DSG

Location: North Little Rock, Arkansas

Condition of Material: Good

ROLL COUNT	ROLL NUMBER	RESIN OR LOT NO.	MATERIAL DIMENSIONS				QC/QA CERT.	CONF. SAMPLE	REMARKS
			LENGTH (FEET)	WIDTH (FEET)	SQUARE FEET	THICK (MILLS)			
1	310810001	CEFX54038	230	14.5	3,335	289	JWS	YES	PASSED
2	310810002	CEFX54038	230	14.5	3,335		JWS		
3	310810003	CEFX54038	230	14.5	3,335		JWS		
4	310810004	CEFX54038	230	14.5	3,335		JWS		
5	310810005	CEFX54038	230	14.5	3,335		JWS		
6	310810006	CEFX54038	230	14.5	3,335		JWS		
7	310810007	CEFX54038	230	14.5	3,335		JWS		
8	310810008	CEFX54038	230	14.5	3,335		JWS		
9	310810009	CEFX54038	230	14.5	3,335		JWS		
10	310810010	CEFX54038	230	14.5	3,335		JWS		
11	310810011	CEFX54038	230	14.5	3,335		JWS		
12	310810012	CEFX54038	230	14.5	3,335		JWS		
13	310810013	CEFX54038	230	14.5	3,335		JWS		
14	310810014	CEFX54038	230	14.5	3,335		JWS		
15	310810015	CEFX54038	230	14.5	3,335		JWS		
16	310810016	CEFX54038	230	14.5	3,335		JWS		
17	310810017	CEFX54038	230	14.5	3,335		JWS		
18	310810018	CEFX54038	230	14.5	3,335		JWS		
19	310810019	CEFX54038	230	14.5	3,335		JWS		
20	310810020	CEFX54038	230	14.5	3,335		JWS		
21	310810021	CEFX54038	230	14.5	3,335		JWS		
22	310810022	CEFX54038	230	14.5	3,335		JWS		
23	310810023	CEFX54038	230	14.5	3,335		JWS		
24	310810024	CEFX54038	230	14.5	3,335		JWS		
25	310810025	CEFX54038	230	14.5	3,335		JWS		

TOTAL THIS PAGE: 83,375 ft²
TOTAL ACCUMULATED: 83,375 ft²

Material Type Legend:

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Terracon

**25809 Interstate 30 South
Bryant, AR 72022
Phone: 501.847.9292
Fax: 501.847.9210**

Manufacturer:	SKAPS
Transportation:	Truck
Date of Arrival:	8/5/09
Material Type:	DSG
Condition of Material:	Good

TOTAL THIS PAGE: 33,350 ft²
TOTAL ACCUMULATED: 116,725 ft²

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Geosynthetics Inventory



Terracon Project No: 35097116

25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Manufacturer: SKAPS

Contractor: Grayco

Transportation: Truck

Project Name: Two Pine - Cell 3

Date of Arrival: 8/6/09

Address: Two Pine Class 1 Landfill

Material Type: DSG

Location: North Little Rock, Arkansas

Condition of Material: Good

ROLL COUNT	ROLL NUMBER	RESIN OR LOT NO.	MATERIAL DIMENSIONS				QC/QA CERT.	CONF. SAMPLE	REMARKS
			LENGTH (FEET)	WIDTH (FEET)	SQUARE FEET	THICK (MILLS)			
36	310810028	CEFX54038	230	14.5	3,335		JWS		
37	310810029	CEFX54038	230	14.5	3,335		JWS		
38	310810030	CEFX54038	230	14.5	3,335	292	JWS	YES	PASSED
39	310810031	CEFX54038	230	14.5	3,335		JWS		
40	310810032	CEFX54038	230	14.5	3,335		JWS		
41	310810033	CEFX54038	230	14.5	3,335		JWS		
42	310810043	CEFX54038	230	14.5	3,335		JWS		
43	310810044	CEFX54038	230	14.5	3,335		JWS		
44	310810045	CEFX54038	230	14.5	3,335		JWS		
45	310810051	CEFX54038	230	14.5	3,335		JWS		
46	310810054	CEFX54038	230	14.5	3,335		JWS		
47	310810056	CEFX54038	230	14.5	3,335		JWS		
48	310810071	CEFX54038	230	14.5	3,335		JWS		
49	310810072	CEFX54038	230	14.5	3,335		JWS		
50	310810074	CEFX54038	230	14.5	3,335		JWS		
51	310810078	CEFX54038	230	14.5	3,335		JWS		
52	310810079	CEFX54038	230	14.5	3,335		JWS		
53	310810080	CEFX54038	230	14.5	3,335		JWS		
54	310810082	CEFX54038	230	14.5	3,335		JWS		
55	310810085	CEFX54038	230	14.5	3,335		JWS		
56	310810086	CEFX54038	230	14.5	3,335		JWS		
57	310810087	CEFX54038	230	14.5	3,335		JWS		
58	310810088	CEFX54038	230	14.5	3,335		JWS		
59	310810091	CEFX54038	230	14.5	3,335		JWS		
60	310810092	CEFX54038	230	14.5	3,335		JWS		

TOTAL THIS PAGE: 83,375 ft²
TOTAL ACCUMULATED: 200,100 ft²

Material Type Legend:

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Terracon

**25809 Interstate 30 South
Bryant, AR 72022
Phone: 501.847.9292
Fax: 501.847.9210**

Manufacturer:	SKAPS
Transportation:	Truck
Date of Arrival:	8/6/09
Material Type:	DSG
Condition of Material:	Good

TOTAL THIS PAGE: 6,670 ft²
TOTAL ACCUMULATED: 206,770 ft²

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Geosynthetics Inventory



Terracon Project No: 35097116

25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Manufacturer: SKAPS

Contractor: Grayco

Transportation: Truck

Project Name: Two Pine - Cell 3

Date of Arrival: 8/6/09

Address: Two Pine Class 1 Landfill

Material Type: DSG

Location: North Little Rock, Arkansas

Condition of Material: Good

ROLL COUNT	ROLL NUMBER	RESIN OR LOT NO.	MATERIAL DIMENSIONS				QC/QA CERT.	CONF. SAMPLE	REMARKS
			LENGTH (FEET)	WIDTH (FEET)	SQUARE FEET	THICK (MILLS)			
63	310810046	CEFX54038	230	14.5	3,335		JWS		
64	310810048	CEFX54038	230	14.5	3,335		JWS		
65	310810049	CEFX54038	230	14.5	3,335		JWS		
66	310810050	CEFX54038	230	14.5	3,335		JWS		
67	310810052	CEFX54038	230	14.5	3,335		JWS		
68	310810053	CEFX54038	230	14.5	3,335		JWS		
69	310810058	CEFX54038	230	14.5	3,335		JWS		
70	310810059	CEFX54038	230	14.5	3,335		JWS		
71	310810060	CEFX54038	230	14.5	3,335	292	JWS	YES	PASSED
72	310810061	CEFX54038	230	14.5	3,335		JWS		
73	310810062	CEFX54038	230	14.5	3,335		JWS		
74	310810063	CEFX54038	230	14.5	3,335		JWS		
75	310810064	CEFX54038	230	14.5	3,335		JWS		
76	310810065	CEFX54038	230	14.5	3,335		JWS		
77	310810066	CEFX54038	230	14.5	3,335		JWS		
78	310810067	CEFX54038	230	14.5	3,335		JWS		
79	310810069	CEFX54038	230	14.5	3,335		JWS		
80	310810070	CEFX54038	230	14.5	3,335		JWS		
81	310810073	CEFX54038	230	14.5	3,335		JWS		
82	310810075	CEFX54038	230	14.5	3,335		JWS		
83	310810076	CEFX54038	230	14.5	3,335		JWS		
84	310810077	CEFX54038	230	14.5	3,335		JWS		
85	310810081	CEFX54038	230	14.5	3,335		JWS		
86	310810083	CEFX54038	230	14.5	3,335		JWS		
87	310810084	CEFX54038	230	14.5	3,335		JWS		

TOTAL THIS PAGE: 83,375 ft²
TOTAL ACCUMULATED: 290,145 ft²

Material Type Legend:

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Terracon

**25809 Interstate 30 South
Bryant, AR 72022
Phone: 501.847.9292
Fax: 501.847.9210**

Manufacturer:	SKAPS
Transportation:	Truck
Date of Arrival:	8/6/09
Material Type:	DSG
Condition of Material:	Good

TOTAL THIS PAGE: 6,670 ft²
TOTAL ACCUMULATED: 296,815 ft²

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Geosynthetics Inventory



Terracon Project No: 35097116

25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Manufacturer: SKAPS

Contractor: Grayco

Transportation: Truck

Project Name: Two Pine - Cell 3

Date of Arrival: 8/7/09

Address: Two Pine Class 1 Landfill

Material Type: DSG

Location: North Little Rock, Arkansas

Condition of Material: Good

ROLL COUNT	ROLL NUMBER	RESIN OR LOT NO.	MATERIAL DIMENSIONS				QC/QA CERT.	CONF. SAMPLE	REMARKS
			LENGTH (FEET)	WIDTH (FEET)	SQUARE FEET	THICK (MILLS)			
90	310810042	CEFX54038	225	14.5	3,260		JWS		
91	310810047	CEFX54038	230	14.5	3,335		JWS		
92	310810055	CEFX54038	230	14.5	3,335		JWS		
93	310810057	CEFX54038	230	14.5	3,335		JWS		
94	310810068	CEFX54038	230	14.5	3,335		JWS		
95	310810095	CEFX54038	230	14.5	3,335		JWS		
96	310810096	CEFX54038	230	14.5	3,335		JWS		
97	310810097	CEFX54038	230	14.5	3,335		JWS		
98	310810098	CEFX54038	230	14.5	3,335		JWS		
99	310810099	CEFX54038	230	14.5	3,335		JWS		
100	310810100	CEFX54038	230	14.5	3,335		JWS		
101	310810101	CEFX54038	230	14.5	3,335		JWS		
102	310810102	CEFX54038	230	14.5	3,335		JWS		
103	310810103	CEFX54038	230	14.5	3,335		JWS		
104	310810104	CEFX54038	230	14.5	3,335		JWS		
105	310810105	CEFX54038	230	14.5	3,335		JWS		
106	310810106	CEFX54038	230	14.5	3,335		JWS		
107	310810107	CEFX54038	230	14.5	3,335		JWS		
108	310810108	CEFX54038	230	14.5	3,335		JWS		
109	310810109	CEFX54038	230	14.5	3,335		JWS		

TOTAL THIS PAGE: 66,625 ft²
TOTAL ACCUMULATED: 363,440 ft²

Material Type Legend:

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

Terracon

**25809 Interstate 30 South
Bryant, AR 72022
Phone: 501.847.9292
Fax: 501.847.9210**

Manufacturer:	SKAPS
Transportation:	Truck
Date of Arrival:	8/7/09
Material Type:	8oz Geo
Condition of Material:	Good

TOTAL THIS PAGE: 20,700 ft²
TOTAL ACCUMULATED: 20,700 ft²

40S = 40 Mil Smooth HDPE Geomembrane
40T = 40 Mil Textured HDPE Geomembrane
60S = 60 Mil Smooth HDPE Geomembrane
60T = 60 Mil Textured HDPE Geomembrane

DSG - Double Sided Geocomposite
SSG - Single Sided Geocomposite
6oz Geo - 6 ounce Geotextile
12oz Geo - 12 ounce Geotextile

APPENDIX L
GEOMEMBRANE EQUIPMENT CALIBRATION
CERTIFICATE



POLYWELD U.S.A., INC.

1620 EAST RICHEY ROAD
HOUSTON, TEXAS 77073

(281) 821-4156

FAX (281) 821-8901

1-888-325-3168

Email: info@polyweldusa.com

www.polyweldusa.com

Calibration Certificate

Customer:	Texas Enviromental Plastics
Device Calibrated:	Meezan 500 Tensiometer
S/N:	512M2003
Model #:	
Load Cell Type:	Button Type
Voltage:	120V
Date:	6-1-09
Calibration #	CAL1147

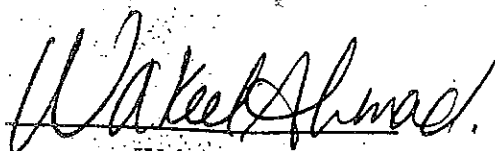
Calibration of the PolyWeld USA Meezan 500 Tensiometer was verified using a calibration load cell indicator on dead weights.

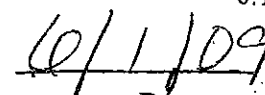
10/27/2008 The readings of the calibration set are recorded as "True Load." The readings of the instrument in question are recorded below as "Display Load."

True Load	Display Load Trial #1	Display Load Trial #2	Display Load Trial #3
0	0	0	0
50	48.8	49.8	50
100	99.3	99.6	99.8
150	149.8	149.9	150
200	199.5	199.7	200
250	249.5	249.6	249.7
300	298.9	299.9	300
350	349.4	349.7	350
400	398.4	399.6	399.9
450	449.6	448.9	450
500	499.7	499.8	500
Error % for each Trial	0.2582	0.1273	0.0218

Average % Error

0.1358


Wakeel Ahmad


Date

18 Years in the Plastic Welding Industry

• Extrusion Welding Machines • Wedge Welders • Spark Tester • Sample Cutter • Tensiometer Meezan 500

APPENDIX M
SUBGRADE ACCEPTANCE CERTIFICATE

TEXAS ENVIRONMENTAL PLASTICS, LTD.
2500 Farrell Road
Houston, Texas 77073

SUBGRADE SURFACE ACCEPTANCE

Project Name: Two Pine Cell 3

Customer: Waste Management

Project Number: 35097116

Date: 8-24-09

Location: North Little Rock, AR

Partial: _____ Final: 358080

This document only applies to the acceptability of surface conditions for installation of geosynthetic products. Texas Environmental Plastics, Ltd. does not accept responsibility for compaction, elevation or moisture content, nor for the surface condition maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the Owner or Earthwork Contractor.

Deployed 6m HDPE - P. 1 to P. 74

For Texas Environmental Plastics, Ltd.:

ROVE INY RATH
R. W. Smith

For Contractor/Owner:

W. W. Smith II
John W. Smith

Acceptance Number: _____ Area Accepted: _____/SF Total Area accepted to date: 358080 - _____/SF

APPENDIX N

GEOMEMBRANE DAILY DEPLOYMENT LOGS

Geosynthetics Daily Deployment Log



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

25809 Interstate 30 South
 Bryant, Arkansas 72022
 (501) 847-9292

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Amb. Temp. (°F)	Weather/ Wind		Length (Feet)	Width (Feet)		
8/18/09	P-1	108135659	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-2	108135647	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-3	108135648	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-4	108135668	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-5	108135643	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-6	108135654	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/18/09	P-7	108135651	88	Sunny / 10 mph	60T	525	23	Y	JWS
8/19/09	P-8	108135646	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-9	108135657	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-10	108135653	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-11	108135667	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-12	108135637	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-13	108135664	82	PC / 10 mph	60T	525	23	Y	JWS
8/19/09	P-14	108135636	82	PC / 10 mph	60T	525	23	Y	JWS
8/22/09	P-15	108135666	75	Sunny / 10 mph	60T	525	23	Y	JWS
8/22/09	P-16	108135652	75	Sunny / 10 mph	60T	525	15.5	Y	JWS
8/22/09	P-17	108135660	75	Sunny / 10 mph	60T	525	23	Y	JWS
8/22/09	P-18	108135645	75	Sunny / 10 mph	60T	525	23	Y	JWS
8/22/09	P-19	108135663	75	Sunny / 10 mph	60T	525	23	Y	JWS
8/22/09	P-20	108135638	82	Sunny / 10 mph	60T	23	23	Y	JWS

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane
 60T - 60-Mil Textured HDPE Geomembrane
 40S - 40-Mil Smooth HDPE Geomembrane
 40T - 40-Mil Textured HDPE Geomembrane

DSGC - Double Sided Geocomposite
 SSGC - Single Sided Geocomposite
 8oz Geo - 8 ounce Geotextile
 12oz Geo - 12 ounce Geotextile

Geosynthetics Daily Deployment Log



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

25809 Interstate 30 South
 Bryant, Arkansas 72022
 (501) 847-9292

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Amb. Temp. (°F)	Weather/ Wind		Length (Feet)	Width (Feet)		
8/22/09	P-21	108135638	82	Sunny / 10 mph	60T	47	23	Y	JWS
8/22/09	P-22	108135638	82	Sunny / 10 mph	60T	47.5	23	Y	JWS
8/22/09	P-23	108135638	82	Sunny 10 mph	60T	48.5	23	Y	JWS
8/22/09	P-24	108135638	82	Sunny 10 mph	60T	49	23	Y	JWS
8/22/09	P-25	108135638	82	Sunny 10 mph	60T	49.5	23	Y	JWS
8/22/09	P-26	108135638	82	Sunny 10 mph	60T	50	23	Y	JWS
8/22/09	P-27	108135638	82	Sunny 10 mph	60T	51	23	Y	JWS
8/22/09	P-28	108135638	82	Sunny 10 mph	60T	51.5	23	Y	JWS
8/22/09	P-29	108135638	82	Sunny 10 mph	60T	51.5	23	Y	JWS
8/22/09	P-30	108135638	82	Sunny 10 mph	60T	29	23	Y	JWS
8/22/09	P-31	108135655	82	Sunny 10 mph	60T	23	23	Y	JWS
8/22/09	P-32	108135655	82	Sunny 10 mph	60T	52	23	Y	JWS
8/22/09	P-33	108135655	82	Sunny 10 mph	60T	54	23	Y	JWS
8/22/09	P-34	108135655	82	Sunny 10 mph	60T	55	23	Y	JWS
8/22/09	P-35	108135655	82	Sunny 10 mph	60T	55.5	23	Y	JWS
8/22/09	P-36	108135655	82	Sunny 10 mph	60T	55	23	Y	JWS
8/22/09	P-37	108135655	82	Sunny 10 mph	60T	54	23	Y	JWS
8/22/09	P-38	108135655	82	Sunny 10 mph	60T	54.5	23	Y	JWS
8/22/09	P-39	108135655	82	Sunny 10 mph	60T	53.5	23	Y	JWS
8/22/09	P-40	108135655	82	Sunny 10 mph	60T	52.5	23	Y	JWS

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane
 60T - 60-Mil Textured HDPE Geomembrane
 40S - 40-Mil Smooth HDPE Geomembrane
 40T - 40-Mil Textured HDPE Geomembrane

DSGC - Double Sided Geocomposite
 SSGC - Single Sided Geocomposite
 8oz Geo - 8 ounce Geotextile
 12oz Geo - 12 ounce Geotextile

Geosynthetics Daily Deployment Log



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

25809 Interstate 30 South
 Bryant, Arkansas 72022
 (501) 847-9292

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Amb. Temp. (°F)	Weather/ Wind		Length (Feet)	Width (Feet)		
8/22/09	P-41	108135641	82	Sunny / 15 mph	60T	42.5	23	Y	JWS
8/22/09	P-42	108135641	82	Sunny / 15 mph	60T	32	23	Y	JWS
8/22/09	P-43	108135644	82	Sunny / 15 mph	60T	451	23	Y	JWS
8/22/09	P-44	108135650	82	Sunny / 15 mph	60T	374	23	Y	JWS
8/22/09	P-45	108135644	82	Sunny / 15 mph	60T	62	23	Y	JWS
8/22/09	P-46	108135650	82	Sunny / 15 mph	60T	139	23	Y	JWS
8/22/09	P-47	108135641	82	Sunny / 15 mph	60T	282	23	Y	JWS
8/22/09	P-48	108135641	82	Sunny / 15 mph	60T	162.5	23	Y	JWS
8/22/09	P-49	108135656	82	Sunny / 15 mph	60T	237	23	Y	JWS
8/22/09	P-50	108135656	82	Sunny / 15 mph	60T	280	23	Y	JWS
8/22/09	P-51	108135649	82	Sunny / 15 mph	60T	109	23	Y	JWS
8/22/09	P-52	108135649	82	Sunny / 15 mph	60T	373	23	Y	JWS
8/22/09	P-53	108135649	82	Sunny / 15 mph	60T	31	23	Y	JWS
8/22/09	P-54	108135639	82	Sunny / 15 mph	60T	321.5	23	Y	JWS
8/23/09	P-55	108135640	80	Sunny / 10 mph	60T	229	16	Y	JWS
8/23/09	P-56	108135640	80	Sunny / 10 mph	60T	58	23	Y	JWS
8/23/09	P-57	108135665	80	Sunny / 10 mph	60T	168.5	23	Y	JWS
8/23/09	P-58	108135665	80	Sunny / 10 mph	60T	231	23	Y	JWS
8/23/09	P-59	108135665	80	Sunny / 10 mph	60T	119	23	Y	JWS
8/23/09	P-60	108135662	80	Sunny / 10 mph	60T	203	23	Y	JWS

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane
 60T - 60-Mil Textured HDPE Geomembrane
 40S - 40-Mil Smooth HDPE Geomembrane
 40T - 40-Mil Textured HDPE Geomembrane

DSGC - Double Sided Geocomposite
 SSGC - Single Sided Geocomposite
 8oz Geo - 8 ounce Geotextile
 12oz Geo - 12 ounce Geotextile

Geosynthetics Daily Deployment Log



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

25809 Interstate 30 South
 Bryant, Arkansas 72022
 (501) 847-9292

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Amb. Temp. (°F)	Weather/ Wind		Length (Feet)	Width (Feet)		
8/23/09	P-61	108135662	80	Sunny / 10 mph	60T	302	23	Y	JWS
8/23/09	P-62	108135642	80	Sunny / 10 mph	60T	273	23	Y	JWS
8/23/09	P-63	108135642	80	Sunny / 10 mph	60T	246.5	23	Y	JWS
8/23/09	P-64	108135661	80	Sunny / 10 mph	60T	23.5	23	Y	JWS
8/23/09	P-65	108135661	80	Sunny / 10 mph	60T	242	23	Y	JWS
8/23/09	P-66	108135661	80	Sunny / 10 mph	60T	228.5	23	Y	JWS
8/23/09	P-67	108135661	80	Sunny / 10 mph	60T	13	23	Y	JWS
8/23/09	P-68	108135639	80	Sunny / 10 mph	60T	195	23	Y	JWS
8/23/09	P-69	108135640	80	Sunny / 10 mph	60T	63	23	Y	JWS
8/23/09	P-70	108135662	80	Sunny / 10 mph	60T	11.5	23	Y	JWS
8/23/09	P-71	108135640	80	Sunny / 10 mph	60T	105.5	23	Y	JWS
8/23/09	P-72	108137102	80	Sunny / 10 mph	60T	93.5	23	Y	JWS
8/23/09	P-73	108137102	80	Sunny / 10 mph	60T	71.5	23	Y	JWS
8/22/09	P-74	108135641	82	Sunny / 15 mph	60T	31	10	Y	JWS

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane
 60T - 60-Mil Textured HDPE Geomembrane
 40S - 40-Mil Smooth HDPE Geomembrane
 40T - 40-Mil Textured HDPE Geomembrane

DSGC - Double Sided Geocomposite
 SSGC - Single Sided Geocomposite
 8oz Geo - 8 ounce Geotextile
 12oz Geo - 12 ounce Geotextile

APPENDIX O

GEOMEMBRANE TRIAL WELD SUMMARY

Terracon

Bryant, Arkansas 72022

Phone 501.847.9292

Fax 501.847.9210

Liner Installer: TEP

Shear Fusion = 121

Date	Time	Ambient Temp °F	Sample ID	QC Initials	Machine Number	Seamer Initials	Weld Type	Fusion Weld		Extrusion Weld		Test Values lbs/inch										Pass or Fail	
								Wedge Temp °F	Speed ft/hr	Temp °F	Preheat Setting												
8/18/09	10:15	80	1	JWS	21	MT	F	740	500.0			P	120	107	116	112	109	117	118	109	110	110	Pass
												S	165		162		166		164		163		
8/18/09	10:25	80	2	JWS	22	RH	F	730	650.0			P	129	120	124	113	120	110	114	130	120	112	Pass
												S	167		159		170		164		156		
8/18/09	10:30	80	3	JWS	23	SP	F	730	700.0			P	122	133	112	120	112	119	115	115	110	110	Pass
												S	155		156		154		157		152		
8/18/09	10:45	80	4	JWS	24	AG	F	735	500.0			P	131	123	126	122	132	113	121	115	114	104	Pass
												S	157		159		159		156		156		
8/18/09	13:30	88	5	JWS	21	MT	F	740	500.0			P	112	124	114	121	115	138	116	120	117	127	Pass
												S	154		154		153		157		148		
8/18/09	13:40	88	6	JWS	22	RH	F	730	650.0			P	134	134	129	131	131	130	132	133	128	115	Pass
												S	147		154		149		150		148		
8/18/09	13:45	88	7	JWS	24	AG	F	735	500.0			P	102	117	116	120	129	112	133	114	122	142	Pass
												S	150		154		154		148		146		
8/18/09	13:50	88	8	JWS	23	SP	F	730	650.0			P	111	119	120	116	118	145	135	114	120	124	Pass
												S	159		157		161		164		161		
8/18/09	16:20	88	9	JWS	26	AR	E			319		P	145		132		154		142		144		Pass
												S	164		163		163		160		158		
8/19/09	8:28	76	10	JWS	24	AG	F	735	450.0			P	137	119	117	130	123	136	120	119	124	126	Pass
												S	189		192		184		182		194		
8/19/09	13:15	80	11	JWS	24	AG	F	735	550.0			P	122	136	124	130	128	130	118	131	119	134	Pass
												S	164		167		168		162		162		
8/19/09	13:20	80	12	JWS	26	AR	E			319		P	143		144		163		155		148		Pass
												S	177		180		180		182		181		
8/19/09	13:25	80	13	JWS	25	LV	E			319		P	134		138		126		132		126		Pass
												S	171		173		173		169		171		
8/19/09	15:55	80	14	JWS	21	MT	F	740	500.0			P	114	137	130	132	131	126	131	134	120	125	Pass
												S	159		156		157		156		157		

Terracon

Bryant, Arkansas 72022

Fax 501.847.9210

Liner Installer: TEP

Shear Fusion = 121

[illegible]

Terracon

Bryant, Arkansas 72022

Fax 501.847.9210

Liner Installer: TEP

Shear Fusion = 121

Date	Time	Ambient Temp °F	Sample ID	QC Initials	Machine Number	Seamer Initials	Weld Type	Fusion Weld		Extrusion Weld		Test Values lbs/inch										Pass or Fail	
								Wedge Temp °F	Speed ft/hr	Temp °F	Preheat Setting												
8/23/09	7:35	72	27	JWS	21	MT	F	740	430.0			P	133	133	134	139	132	130	129	136	143	144	Pass
												S	201		206		199		210		208		
8/23/09	7:40	72	28	JWS	23	SP	F	730	500.0			P	140	134	142	144	138	140	140	144	143	140	Pass
												S	212		210		200		201		206		
8/23/09	7:45	72	29	JWS	22	RH	F	730	500.0			P	124	129	126	128	145	142	142	138	138	123	Pass
												S	189		188		184		190		186		
8/23/09	7:50	72	30	JWS	24	AG	F	735	552.0			P	143	142	142	140	144	143	138	142	146	142	Pass
												S	198		194		186		192		194		
8/23/09	7:55	72	31	JWS	26	AR	E			319	319	P	127		157		146		153		159		Pass
												S	214		216		218		216		207		
8/23/09	13:05	80	32	JWS	23	SP	F	730	550.0			P	119	150	124	128	142	126	136	142	132	127	Pass
												S	171		174		176		167		172		
8/23/09	13:15	80	33	JWS	24	AG	F	735	500.0			P	144	140	142	142	139	143	140	144	137	141	Pass
												S	108		172		174		165		174		
8/23/09	13:20	80	34	JWS	26	AR	E			319	319	P	119		112		114		117		119		Pass
												S	156		149		154		157		154		
8/23/09	15:30	80	35	JWS	25	MI	E			320	320	P	124		128		128		122		128		Pass
												S	167		162		182		180		184		
8/24/09	7:40	75	36	JWS	23	SP	F	730	500.0			P	120	115	112	110	126	117	120	122	124	132	Pass
												S	210		208		201		206		204		
8/24/09	7:45	75	37	JWS	26	AR	E			319	319	P	125		117		114		110		112		Pass
												S	194		188		192		194		199		
8/24/09	7:50	75	38	JWS	25	MT	E			330	330	P	123		119		112		136		119		Pass
												S	166		167		164		174		159		
8/24/09	8:00	72	39	JWS	26	AR	E			319	319		140		106		112		133		111		Pass
													194		192		196		193		180		

APPENDIX P

GEOMEMBRANE PANEL SEAMING SUMMARY

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 0 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/18/09	11:00	MT	P1 - P2	520.0	JWS	WOB - P66	520	DS-1	20' W OF E.EOS	Pass	Pass
8/18/09	11:22	RH	P3 - P4	520.0	JWS	WOB - P64	1040	DS-3	20'W OF E. EOS	Pass	Pass
8/18/09	11:22	SP	P2 - P3	524.0	JWS	WOB - P65	1564	DS-2	20'W OF E. EOS	Pass	Pass
8/18/09	11:00	AG	EX - P1	22.5	JWS	WB7-29.5E	1587				
8/18/09	11:10	AG	EX - P1	22.5	JWS	WB29.5-52E	1609				
8/18/09	11:20	AG	EX - P1	22.5	JWS	WB52-74.5E	1632				
8/18/09	11:30	AG	EX - P1	22.5	JWS	WB74.5-97E	1654				
8/18/09	11:40	AG	EX - P1	10.0	JWS	WB97-108E	1664				
8/18/09	11:50	AG	EX - P1	6.0	JWS	WB108-114E	1670				
8/18/09	12:00	AG	EX - P1	6.0	JWS	WB114-120E	1676				
8/18/09	12:10	AG	EX - P1	17.5	JWS	WB120-137.5E	1694				
8/18/09	12:20	AG	EX - P1	5.0	JWS	WB137.5-142.5E	1699				
8/18/09	12:30	AG	EX - P1	22.5	JWS	WB142.5-165E	1721				
8/18/09	12:40	AG	EX - P1	22.5	JWS	WB165-187.5E	1744				
8/18/09	12:50	AG	EX - P1	22.5	JWS	WB187.5-210E	1766				
8/18/09	13:00	AG	EX - P1	22.0	JWS	WB210-232E	1788				
8/18/09	13:10	AG	EX - P1	22.5	JWS	WB255.5-278E	1811				
8/18/09	13:20	AG	EX - P1	22.5	JWS	WB278-301.5E	1833				
8/18/09	13:30	AG	EX - P1	22.5	JWS	WB301.5-324E	1856				
8/18/09	13:40	AG	EX - P1	22.5	JWS	WB324-346.5E	1878				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 1,878 ft
Accumulated: 1,878 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 1,878 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/18/09	13:50	AG	Ex - P1	8.5	JWS	WB346.5-355E	1887				
8/19/09	8:50	AG	Ex - P1	22.0	JWS	WB371-393E	1909				
8/19/09	9:00	AG	Ex - P1	22.0	JWS	WB393-415E	1931				
8/19/09	9:10	AG	Ex - P1	22.5	JWS	WB415-437.5E	1953				
8/19/09	9:20	AG	Ex - P1	16.5	JWS	WB437.5-454E	1970				
8/18/09	13:40	AB	P4 - P5	520.0	JWS	WOB - P64	2490	DS-4	30' E of WOB	Pass	Pass
8/18/09	14:00	SP	P5 - P6	330.0	JWS	WOB - 330' E.	2820				
8/19/09	10:50	AG	P5 - P6	190.0	JWS	P61 - 195' W.	3010	DS-5	W42' E end of P61	Pass	Pass
8/19/09	13:38	AG	P6 - P7	520.0	JWS	WOB - P60	3530	DS-6	W42' E end of P60	Pass	Pass
8/19/09	16:30	AG	P7 - P8	520.0	JWS	WOB - P58	4050	DS-7	W42' E end of P58	Pass	Pass
8/19/09	16:13	RH	P8 - P9	525.0	JWS	WOB - P57	4575	DS-8	W42' E end of P57	Pass	Pass
8/19/09	16:33	MT	P9 - P10	525.0	JWS	WOB - P55	5100	DS-9	W42' E end of P55	Pass	Pass
8/19/09	16:45	SP	P10 - P11	525.0	JWS	WOB - P53	5625	DS-10	W42' E end of P53	Pass	Pass
8/19/09	17:40	AG	P11 - P12	525.0	JWS	WOB - P52	6150	DS-11	W42' E end of P52	Pass	Pass
8/19/09	18:13	RH	P12 - P13	525.0	JWS	WOB - P50	6675	DS-12	W42' E end of P50	Pass	Pass
8/19/09	18:14	MT	P13 - P14	525.0	JWS	WOB - P49	7200	DS-13	W42' E end of P49	Pass	Pass
8/22/09	8:00	SP	P14 - P15	525.0	JWS	WOB - P46	7725	DS-14	W42' E end of P46	Pass	Pass
8/22/09	8:10	RH	P15 - P16	525.0	JWS	WOB - P45	8250	DS-15	W42' E end of P45	Pass	Pass
8/22/09	10:10	RH	P16 - P17	525.0	JWS	WOB - P45	8775	DS-16	W42' E end of P43	Pass	Pass
8/22/09	9:40	MT	P17 - P18	525.0	JWS	WOB - P43	9300	DS-17	W42' E end of P20	Pass	Pass

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER WOB = NORTH OVERBUILD BERM

This Page: 7,422 ft
Accumulated: 9,300 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 9,300 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/22/09	9:38	AG	P19 - P18	525.0	JWS	WOB - P20	9825	DS-18	50'W of P20	Pass	Pass
8/22/09	14:10	AG	P20 - P19	22.5	JWS	NOB - P18	9848				
8/22/09	13:56	AG	P20 - P18	22.5	JWS	P19 - P43	9870				
8/22/09	11:45	AG	P17 - P43	22.5	JWS	P20 - P45	9893				
8/22/09	11:56	AG	P16 - P45	22.5	JWS	P43 - P15	9915				
8/22/09	12:12	AG	P15 - P46	15.0	JWS	P45 - P14	9930				
8/22/09	13:45	AG	P20 - P43	22.5	JWS	P18 - P21	9953				
8/22/09	14:09	AG	P21 - P20	46.0	JWS	NOB - P43	9999				
8/22/09	13:40	AG	P21 - P43	22.5	JWS	P20 - P22	10021				
8/22/09	13:43	RH	P22 - P21	46.0	JWS	NOB - P43	10067				
8/22/09	14:28	AG	P22 - P43	22.5	JWS	P21 - P23	10090				
8/22/09	13:58	RH	P23 - P22	48.0	JWS	NOB - P43	10138				
8/22/09	14:27	AG	P23 - P43	22.5	JWS	P22 - P24	10160				
8/22/09	14:10	RH	P24 - P23	48.5	JWS	NOB - P43	10209				
8/22/09	14:48	AG	P24 - P43	22.5	JWS	P23 - P25	10231				
8/22/09	14:22	RH	P25 - P24	49.0	JWS	NOB - P43	10280				
8/22/09	14:40	AG	P25 - P43	22.5	JWS	P24 - P26	10303				
8/22/09	14:24	RH	P26 - P25	49.0	JWS	NOB - P43	10352				
8/22/09	15:00	AG	P26 - P43	22.5	JWS	P25 - P27	10374				
8/22/09	14:00	SP	P27 - P26	50.0	JWS	NOB - P43	10424				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
 EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 1,124 ft
 Accumulated: 10,424 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 10,424 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/22/09	14:56	AG	P27 - P43	22.5	JWS	P26 - P28	10447				
8/22/09	14:20	SP	P28 - P27	51.0	JWS	NOB - P43	10498	DS-19	9' FROM P43	Pass	Pass
8/22/09	14:30	AG	P28 - P43	22.5	JWS	P27 - P29	10520				
8/22/09	14:48	SP	P29 - P28	51.0	JWS	NOB - P43	10571				
8/22/09	15:11	AG	P29 - P43	22.5	JWS	P28 - P30	10594				
8/22/09	15:05	SP	P30 - P29	28.0	JWS	P31 - P43	10622				
8/22/09	15:20	SP	P31 - P29	22.0	JWS	NOB - P30	10644				
8/22/09	15:00	SP	P30 - P31	22.5	JWS	P29 - P32	10666				
8/22/09	15:50	SP	P32 - P30	51.0	JWS	P31 - P43	10717				
8/22/09	16:00	SP	P32 - P31	22.0	JWS	NOB - P30	10739				
8/22/09	15:33	AG	P30 - P43	22.5	JWS	P29 - P32	10762				
8/22/09	15:28	AG	P32 - P43	22.5	JWS	P30 - P33	10784	DS-21	8.5' FROM P30	Pass	Pass
8/22/09	15:58	SP	P33 - P32	54.0	JWS	NOB - P43	10838				
8/22/09	15:51	AG	P33 - P43	22.5	JWS	P32 - P34	10861				
8/22/09	14:54	RH	P34 - P33	54.5	JWS	NOB - P43	10915				
8/22/09	15:43	AG	P34 - P43	22.5	JWS	P33 - P35	10938				
8/22/09	15:08	RH	P35 - P34	55.0	JWS	NOB - P43	10993				
8/22/09	16:05	AG	P35 - P43	22.5	JWS	P34 - P36	11015				
8/22/09	15:23	RH	P36 - P35	54.5	JWS	NOB - P43	11070				
8/22/09	16:00	AG	P36 - P43	22.5	JWS	P35 - P37	11092				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
 EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 668 ft
 Accumulated: 11,092 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 11,092 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/22/09	15:38	RH	P37 - P36	54.0	JWS	NOB - P43	11146	DS-20	21.5' FROM P43	Pass	Pass
8/22/09	16:21	AG	P37 - P43	22.5	JWS	P36 - P38	11169				
8/22/09	15:53	RH	P38 - P37	53.5	JWS	NOB - P43	11222				
8/22/09	16:16	AG	P38 - P43	22.5	JWS	P37 - P39	11245				
8/22/09	16:07	RH	P39 - P38	53.0	JWS	NOB - P43	11298				
8/22/09	16:00	AG	P39 - P43	22.5	JWS	P38 - P40	11320				
8/22/09	16:21	RH	P40 - P39	52.0	JWS	NOB - P43	11372				
8/22/09	16:44	AG	P42 - P40	22.5	JWS	P41 - P74	11395				
8/22/09	16:43	RH	P74 - P42	31.0	JWS	P40 - AT	11426				
8/22/09	12:12	AG	P15 - P45	7.0	JWS	P16 - P46	11433				
8/22/09	12:15	AG	P14 - P46	7.5	JWS	P15 - P49	11440				
8/22/09	17:56	SP	P14 - P49	13.5	JWS	P46 - P13	11454				
8/22/09	18:00	SP	P13 - P49	7.0	JWS	P14 - P50	11461				
8/22/09	18:21	SP	P13 - P50	14.0	JWS	P49 - P12	11475				
8/22/09	18:30	SP	P12 - P50	7.5	JWS	P13 - P52	11482				
8/22/09	18:37	SP	P12 - P52	14.0	JWS	P50 - P11	11496				
8/22/09	18:41	SP	P11 - P52	7.5	JWS	P12 - P53	11504				
8/22/09	18:50	SP	P11 - P53	14.0	JWS	P52 - P10	11518				
8/22/09	18:54	SP	P10 - P53	7.5	JWS	P11 - P55	11525				
8/22/09	19:40	SP	P43 - P45	61.0	JWS	P17 - P44	11586				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 494 ft
Accumulated: 11,586 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 11,586 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/22/09	11:50	SP	P45 - P44	22.5	JWS	P43 - P46	11609				
8/22/09	13:34	MT	P43 - P44	371.0	JWS	P45 - AT	11980	DS-22	289' FROM W.EOS	Pass	Pass
8/22/09	15:17	MT	P44 - P47	282.0	JWS	P46 - AT	12262	DS-23	71' FROM AT	Pass	Pass
8/22/09	16:10	SP	P47 - P48	165.0	JWS	P49 - AT	12427				
8/22/09	16:22	SP	P49 - P48	22.5	JWS	P47 - P50	12449				
8/22/09	17:03	SP	P47 - P49	103.0	JWS	P46 - P48	12552				
8/22/09	17:35	SP	P46 - P49	133.5	JWS	P14 - P47	12686				
8/22/09	17:50	MT	P49 - P50	233.5	JWS	P13 - P48	12919	DS-24	50' FROM P13	Pass	Pass
8/22/09	17:20	MT	P48 - P50	45.0	JWS	P49 - P51	12964				
8/22/09	17:00	MT	P50 - P51	22.5	JWS	P48 - P52	12987				
8/22/09	17:10	MT	P48 - P51	107.0	JWS	P50 - AT	13094				
8/22/09	17:08	SP	P51 - P52	91.0	JWS	P50 - AT	13185				
8/22/09	17:21	SP	P50 - P52	279.5	JWS	P12 - P51	13464	DS-25	50' FROM P12	Pass	Pass
8/22/09	18:31	AG	P52 - P53	30.0	JWS	P11 - P54	13494				
8/22/09	18:18	SP	P53 - P54	22.5	JWS	P52 - P55	13517				
8/22/09	18:50	AG	P52 - P54	323.5	JWS	P53 - AT	13840	DS-26	20' FROM P53	Pass	Pass
8/22/09	13:40	SP	P44 - P46	76.0	JWS	P45 - P47	13916				
8/22/09	11:38	RH	P53 - P55	30.5	JWS	P10 - P54	13947				
8/22/09	10:51	RH	P54 - P55	193.5	JWS	P53 - P71	14140				
8/22/09	10:30	AG	P55 - P56	58.0	JWS	P57 - P72	14198				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 2,612 ft
Accumulated: 14,198 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 14,198 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/23/09	10:40	AG	P57 - P56	22.5	JWS	P55 - P58	14221				
8/23/09	10:57	AG	P55 - P57	165.5	JWS	P9 - P56	14386	DS-27	50' E. OF P9	Pass	Pass
8/23/09	10:15	SP	P58 - P57	165.5	JWS	P8 - P56	14552				
8/23/09	10:40	SP	P58 - P56	58.0	JWS	P57 - P72	14610				
8/23/09	10:20	RH	P59 - P58	38.0	JWS	P60 - P73	14648				
8/23/09	9:05	SP	P60 - P59	22.5	JWS	P58 - P61	14670				
8/23/09	9:57	RH	P60 - P58	198.0	JWS	P7 - P59	14868	DS-28	50' E. OF P7	Pass	Pass
8/23/09	9:40	MT	P61 - P60	198.0	JWS	P6 - P59	15066				
8/23/09	9:16	SP	P61 - P59	98.0	JWS	P6 - AT	15164				
8/23/09	8:55	RH	P62 - P61	269.0	JWS	P70 - AT	15433	DS-29	50' E. OF P70	Pass	Pass
8/23/09	8:46	RH	P70 - P61	11.0	JWS	P5 - P62	15444				
8/23/09	8:31	RH	P70 - P62	22.5	JWS	P61 - P64	15467				
8/23/09	8:23	RH	P64 - P70	11.0	JWS	P4 - P62	15478				
8/23/09	7:45	SP	P64 - P62	12.0	JWS	P70 - P63	15490				
8/23/09	7:40	SP	P64 - P63	22.5	JWS	P62 - P65	15512				
8/23/09	8:00	SP	P63 - P62	235.0	JWS	P64 - AT	15747				
8/23/09	13:55	SP	P54 - P71	105.0	JWS	P55 - AT	15852				
8/23/09	14:00	SP	P55 - P71	13.5	JWS	P56 - P54	15866				
8/23/09	14:05	SP	P56 - P71	8.5	JWS	P72 - P55	15874				
8/23/09	14:10	SP	P56 - P72	11.5	JWS	P58 - P72	15886				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 1,688 ft
Accumulated: 15,886 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 22, 23 & 24

Carry Over: 15,886 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/23/09	14:15	SP	P58 - P72	10.0	JWS	P73 - P56	15896				
8/23/09	15:10	SP	P73 - P72	71.0	JWS	P58 - E.EOS	15967				
8/23/09	15:21	SP	P58 - P73	12.0	JWS	P59 - P56	15979				
8/23/09	8:01	MT	P59 - P73	70.0	JWS	P58 - E.EOS	16049				
8/23/09	8:21	MT	P65 - P63	221.0	JWS	P64 - E.EOS	16270	DS-30	30' E OF P64	Pass	Pass
8/23/09	8:07	MT	P65 - P64	23.5	JWS	P3 - P63	16294				
8/23/09	8:25	MT	P1 - P66	4.0	JWS	P2 - P67	16298	DS-31	R141 @ P1-P66	Pass	*Fail
8/23/09	9:25	AG	P66 - P65	225.0	JWS	P2 - E.EOS	16523				
8/23/09	19:09	AG	P2 - P66	18.0	JWS	P65 - P1	16541				
8/23/09	19:20	AG	P67 - P66	11.5	JWS	P1 - P68	16552				
8/23/09	19:30	AG	P67 - P68	22.5	JWS	P66 - EX	16575				
8/23/09	18:52	RH	P68 - P66	101.5	JWS	P67 - E.EOS	16676				
8/23/09	13:16	SP	P69 - P68	58.0	JWS	EX - E.EOS	16734				
8/23/09	16:54	RH	P41 - P42	28.0	JWS	P40 - AT	16762				
8/23/09	16:56	AG	P40 - P41	22.5	JWS	P42 - E.EOS	16785				
8/23/09	16:40	AG	P40 - P74	10.0	JWS	P42 - P43	16795				
8/23/09	17:10	AG	P40 - P43	22.5	JWS	P39 - P74	16817				
8/23/09	17:03	AG	P74 - P43	15.0	JWS	P40 - AT	16832				
8/23/09	14:20	SP	P45 - P46	62.5	JWS	P15 - P44	16895				
8/23/09	16:38	MT	P47 - P46	22.5	JWS	P44 - P49	16917				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH

EX = EXISTING LINER

* RETESTS OF DESTRUCT 31 ARE ON DESTRUCT LOG

This Page: 1,031 ft

Accumulated: 16,917 ft

Geomembrane Panel Seaming Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

☒ Primary

☐ Secondary

☐ Other: _____

Machine No. W# 21, 23, & 24

Carry Over: 16,917 ft

PRODUCTION SEAM			LOCATION AND DISTANCE					DESTRUCTIVE TESTING			
Date	Time	Seamer Initials	Seam Number	Seam Length (ft)	QA ID	Location From - To	Accum. Seam Length (ft)	Destruct No.	Location From - To	Field Test Pass/Fail	Lab Test Pass/Fail
8/23/09	11:26	SP	P10 - P55	15.0	JWS	P57 - P53	16932				
8/23/09	11:31	SP	P9 - P57	18.0	JWS	P8 - P10	16950				
8/23/09	11:36	SP	P8 - P57	5.0	JWS	P9 - P58	16955				
8/23/09	11:41	SP	P8 - P58	20.0	JWS	P7 - P57	16975				
8/23/09	11:45	SP	P7 - P58	4.0	JWS	P8 - P60	16979				
8/23/09	11:55	SP	P7 - P60	19.0	JWS	P6 - P58	16998				
8/23/09	12:06	SP	P6 - P60	4.0	JWS	P7 - P61	17002				
8/23/09	12:11	SP	P6 - P61	19.0	JWS	P5 - P60	17021				
8/23/09	12:15	SP	P5 - P61	4.0	JWS	P6 - P70	17025				
8/23/09	8:54	AG	P5 - P70	19.0	JWS	P4 - P61	17044	DS-34	4' N OF P4	Pass	Pass
8/23/09	8:56	AG	P4 - P70	4.0	JWS	P5 - P64	17048				
8/23/09	9:00	AG	P4 - P64	19.0	JWS	P3 - P70	17067	DS-33	4'N OF P3	Pass	Pass
8/23/09	9:10	AG	P3 - P64	4.0	JWS	P4 - P65	17071				
8/23/09	9:05	AG	P3 - P65	19.0	JWS	P2 - P64	17090	DS-32	4'N OF P2	Pass	Pass
8/23/09	9:20	AG	P2 - P65	4.0	JWS	P3 - P66	17094				
8/23/09	7:15	AG	P1 - P67	19.0	JWS	EX - P66	17113				
8/23/09	7:25	AG	P67 - EX	14.5	JWS	P1 - P68	17128				
8/23/09	8:05	AG	P68 - EX	118.0	JWS	P67 - P69	17246				
8/23/09	9:21	MT	P69 - EX	32.0	JWS	P68 - AT	17278				
8/23/09	9:42	MT	P71 - P72	101.0	JWS	P56 - AT	17379				

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 462 ft
Accumulated: 17,379 ft

Terracon

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

☒ Primary

☐ **Secondary**

☐ Other: _____

Carry Over: 17,379 ft

[illegible]

Seam Length this Machine:

Note: E.EOS = EAST END OF SEAM AT = ANCHOR TRENCH
EX = EXISTING LINER NOB = NORTH OVERBUILD BERM

This Page: 3 ft
Accumulated: 17.382 ft

APPENDIX Q
GEOMEMBRANE NON-DESTRUCTIVE TEST LOG
SUMMARY

Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section
				Pressure			Time		P/F		From - To
				Start	End	+/-	Start	End			
08/18/09	P1 - P2	520	IS	30	30	0	12:15	12:20	P		WB - P67
08/18/09	EXT - P1	22.5	IS	30	30	0	11:20	11:25	P		WB 7 - 29.5 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:21	11:26	P		WB 29.5 - 52 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:25	11:30	P		WB 52 - 74.5 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:30	11:35	P		WB 74.5 - 97 E
08/18/09	EXT - P1	10	IS	30	30	0	11:37	11:42	P		WB 97 - 108 E
08/18/09	EXT - P1	6	IS	30	30	0	11:38	11:43	P		WB 108 - 114 E
08/18/09	EXT - P1	6	IS	30	30	0	11:40	11:45	P		WB 114 - 120 E
08/18/09	EXT - P1	17.5	IS	30	30	0	11:47	11:52	P		WB 120 - 137.5 E
08/18/09	EXT - P1	5	IS	30	30	0	11:48	11:53	P		WB 137.5 - 142.5 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:50	11:55	P		WB 142.5 - 165 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:58	12:03	P		WB 165 - 187.5 E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:59	12:01	P		WB 187.5 - 210 E
08/18/09	EXT - P1	22	IS	30	30	0	12:05	12:10	P		WB 210 - 232 E
08/18/09	P2 - P3	520	IS	30	30	0	13:25	13:30	P		WB - P65
08/19/09	EXT - P1	22.5	IS	30	30	0	8:45	8:50	P		WB 255.5 - 278 E
08/19/09	EXT - P1	22.5	IS	30	30	0	8:46	8:51	P		WB 278 - 301.5 E
08/19/09	EXT - P1	22.5	IS	30	30	0	8:50	8:55	P		WB 301.5 - 324 E
08/19/09	EXT - P1	22.5	IS	30	30	0	8:51	8:56	P		WB 324 - 346.5 E
08/19/09	EXT - P1	22	IS	30	30	0	9:00	9:05	P		WB 371 - 393 E
08/19/09	EXT - P1	22	IS	30	30	0	9:01	9:06	P		WB 393 - 415 E
08/19/09	EXT - P1	22.5	IS	30	30	0	9:03	9:08	P		WB 415 - 437.5 E
08/19/09	EXT - P1	16.5	IS	30	30	0	9:05	9:10	P		WB 437.5 - 454 E
08/19/09	EXT - P1	320	IS	30	30	0	9:37	9:42	P		WB - 300 E
08/19/09	EXT - P1	190	IS	30	30	0	11:35	11:40	P		WB 300 - 520 E

Key:

AT = Anchor Trench

P1 = Panel Number 1

Ext = Existing

EOS = End of Seam

OBB = Overbuild Berm

WB= West Berm

Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section	
				Pressure			Time		P/F		From - To	
				Start	End	+/-	Start	End				
08/18/09	P1 - P2	520	IS	30	30	0	12:15	12:20	P		W EOS - P66	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:20	11:25	P		7' From W EOS	29.5' E
08/18/09	EXT - P1	22.5	IS	30	30	0	11:21	11:26	P		29.5' W EOS - 52' E	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:25	11:30	P		52' W EOS - 74.5' E	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:30	11:35	P		74.5' W EOS - 97' E	
08/18/09	EXT - P1	10	IS	30	30	0	11:37	11:42	P		97' W EOS - 108' E	
08/18/09	EXT - P1	6	IS	30	30	0	11:38	11:43	P		108' W EOS - 114' E	
08/18/09	EXT - P1	6	IS	30	30	0	11:40	11:45	P		114' W EOS - 120' E	
08/18/09	EXT - P1	17.5	IS	30	30	0	11:47	11:52	P		120' W EOS - 137.5' E	
08/18/09	EXT - P1	5	IS	30	30	0	11:48	11:53	P		137.5' W EOS - 142.5' E	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:50	11:55	P		142.5' W EOS - 165' E	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:58	12:03	P		165' W EOS - 187.5' E	
08/18/09	EXT - P1	22.5	IS	30	30	0	11:59	12:01	P		187.5' W EOS - 210' E	
08/18/09	EXT - P1	22	IS	30	30	0	12:05	12:10	P		210' W EOS - 232' E	
08/18/09	P2 - P3	520	IS	30	30	0	13:25	13:30	P		W EOS - P 65	
08/19/09	EXT - P1	22.5	IS	30	30	0	8:45	8:50	P		255.5' W EOS - 278' E	
08/19/09	EXT - P1	22.5	IS	30	30	0	8:46	8:51	P		278' W EOS - 301.5' E	
08/19/09	EXT - P1	22.5	IS	30	30	0	8:50	8:55	P		301.5' W EOS - 324' E	
08/19/09	EXT - P1	22.5	IS	30	30	0	8:51	8:56	P		324' W EOS - 346.5' E	
08/19/09	EXT - P1	22	IS	30	30	0	9:00	9:05	P		371' W EOS - 393' E	
08/19/09	EXT - P1	22	IS	30	30	0	9:01	9:06	P		393' W EOS - 415' E	
08/19/09	EXT - P1	22.5	IS	30	30	0	9:03	9:08	P		415' W EOS - 437.5' E	
08/19/09	EXT - P1	16.5	IS	30	30	0	9:05	9:10	P		437.5' W EOS - 454' E	
08/19/09	EXT - P1	6	IS	30	30	0	9:37	9:42	P		454' W EOS - 460' E	
08/19/09	EXT - P1	22.5	IS	30	30	0	11:35	11:40	P		460' W EOS - 482.5' E	

Key:

AT = Anchor Trench

P1 = Panel Number 1

Ext = Existing

EOS = End of Seam

OBB = Overbuild Berm

WB= West Berm

Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section	
				Pressure			Time		P/F		From - To	
				Start	End	+/-	Start	End				
08/19/09	P3 - P4	515	IS	30	30	0	14:50	14:55	P		W. EOS - P 64	
08/19/09	P4 - P5	405	IS	30	30	0	9:17	9:22	P		W. EOS 405' E.	
08/19/09	P4 - P5	110	IS	30	30	0	9:49	9:54	P		E. EOS - 110' W.	
08/19/09	P5 - P6	330	IS	30	30	0	10:01	10:06	P		W. EOS - P 61	
08/19/09	P6 - P7	515	IS	30	30	0	15:40	15:45	P		W. EOS - P 60	
08/19/09	P7 - P8	515	IS	30	30	0	17:45	17:50	P		W. EOS - P 58	
08/19/09	P8 - P9	525	IS	30	30	0	18:10	18:15	P		W. EOS - P 57	
08/19/09	P10 - P9	525	IS	30	30	0	18:32	18:37	P		W. EOS - 25' E.	
08/19/09	P10 - P11	525	IS	30	30	0	18:45	18:50	P		W. EOS - P 53	
08/19/09	P12 - P11	525	IS	30	30	0	19:47	19:52	P		W. EOS - P 52	
08/21/09	P13 - P12	525	IS	30	30	0	10:30	10:35	P		W. EOS - P 50	
08/19/09	P10 - P9	500	IS	30	30	0	18:30	18:35	P		25' W. EOS - P 55	
08/22/09	P14 - P13	525	IS	30	30	0	10:36	10:41	P		W. EOS - P 49	
08/22/09	P15 - P14	525	IS	30	30	0	10:07	10:12	P		W. EOS - P 46	
08/22/09	P16 - P15	525	IS	30	30	0	10:10	10:15	P		W. EOS - P 45	
08/22/09	P17 - P16	525	IS	30	30	0	13:15	13:20	P		W. EOS - P 43	
08/22/09	P18 - P17	525	IS	30	30	0	13:17	13:22	P		W. EOS - P 20	
08/22/09	P19 - P18	525	IS	30	30	0	11:19	11:24	P		W. EOS - P 20	
08/22/09	P20 - P18	22	IS	30	30	0	14:20	14:25	P		P 17 - P 19	
08/22/09	P20 - P19	22.5	IS	30	30	0	14:24	14:29	P		P 18 - N. EOS	
08/22/09	P20 - P43	22.5	IS	30	30	0	14:21	14:26	P		P 18 - P 21	
08/22/09	P21 - P20	46	IS	30	30	0	14:30	14:35	P		P 43 - N. EOS	
08/22/09	P21 - P43	22.5	IS	30	30	0	14:31	14:36	P		P 20 - P 22	
08/22/09	P22 - P21	46	IS	30	30	0	14:32	14:37	P		P 43 - N. EOS	
08/22/09	P22 - P43	22.5	IS	30	30	0	14:34	14:39	P		P 21 - P 23	

Key:

AT = Anchor Trench

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OBB = Overbuild Berm

WB= West Berm

Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section
				Pressure			Time		P/F		From - To
				Start	End	+/-	Start	End			
08/22/09	P23 - P22	47	IS	30	30	0	14:40	14:45	P		P 43 - N. EOS
08/22/09	P23 - P43	22.5	IS	30	30	0	14:41	14:46	P		P 22 - P 24
08/22/09	P24 - P23	48	IS	30	30	0	14:42	14:47	P		P 43 - N. EOS
08/22/09	P24 - P43	22.5	IS	30	30	0	14:50	14:55	P		P 25 - P 23
08/22/09	P25 - P24	48.5	IS	30	30	0	14:51	14:56	P		P 43 - N. EOS
08/22/09	P25 - P43	22.5	IS	30	30	0	14:52	14:57	P		P 26 - P 24
08/22/09	P26 - P25	49	IS	30	30	0	14:54	14:59	P		P 43 - N. EOS
08/22/09	P26 - P43	22.5	IS	30	30	0	15:08	15:13	P		P 27 - P 25
08/22/09	P27 - P26	49.5	IS	30	30	0	15:07	15:12	P		P 43 - N. EOS
08/22/09	P27 - P43	22.5	IS	30	30	0	15:09	15:14	P		P 28 - P 26
08/22/09	P28 - P27	49.5	IS	30	30	0	15:10	15:15	P		P 43 - N. EOS
08/22/09	P28 - P43	22.5	IS	30	30	0	15:47	15:52	P		P 29 - P 27
08/22/09	P29 - P28	50	IS	30	30	0	15:48	15:53	P		P 43 - N. EOS
08/22/09	P29 - P43	22.5	IS	30	30	0	15:49	15:54	P		P 28 - P 30
08/22/09	P30 - P29	28	IS	30	30	0	15:51	15:56	P		P 43 - P 31
08/22/09	P30 - P31	22.5	IS	30	30	0	16:10	16:15	P		P 29 - P 32
08/22/09	P31 - P29	22	IS	30	30	0	16:08	16:13	P		P 30 - N. EOS
08/22/09	P32 - P31	22	IS	30	30	0	16:12	16:17	P		P 30 - N. EOS
08/22/09	P32 - P30	28	IS	30	30	0	16:05	16:10	P		P 43 - P 31
08/22/09	P30 - P43	22.5	IS	30	30	0	15:50	15:55	P		P 29 - P 32
08/22/09	P32 - P43	22.5	IS	30	30	0	16:06	16:11	P		P 30 - P 33
08/22/09	P33 - P32	51	IS	30	30	0	16:20	16:25	P		P 43 - N. EOS
08/22/09	P33 - P43	22.5	IS	30	30	0	16:32	16:37	P		P 32 - P 34
08/22/09	P34 - P33	53	IS	30	30	0	16:21	16:26	P		P 43 - N. EOS
08/22/09	P34 - P43	22.5	IS	30	30	0	16:35	16:40	P		P 33 - P 35

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Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section	
				Pressure			Time		P/F		From - To	
				Start	End	+/-	Start	End				
08/22/09	P35 - P34	54	IS	30	30	0	16:22	16:27	P		P 43 - N. EOS	
08/22/09	P35 - P43	22.5	IS	30	30	0	16:37	16:42	P		P 34 - P 36	
08/22/09	P36 - P35	54	IS	30	30	0	16:25	16:30	P		P 43 - N. EOS	
08/22/09	P36 - P43	22.5	IS	30	30	0	16:40	16:45	P		P 35 - P 37	
08/22/09	P37 - P36	53	IS	30	30	0	16:45	16:50	P		P 43 - N. EOS	
08/22/09	P37 - P43	22.5	IS	30	30	0	16:46	16:51	P		P 36 - P 38	
08/22/09	P38 - P37	53	IS	30	30	0	16:50	16:55	P		P 43 - N. EOS	
08/22/09	P38 - P43	22.5	IS	30	30	0	16:47	16:52	P		P 37 - P 39	
08/22/09	P39 - P38	52.5	IS	30	30	0	16:58	17:03	P		P 43 - N. EOS	
08/22/09	P39 - P43	22.5	IS	30	30	0	16:59	17:04	P		P 38 - P 40	
08/22/09	P40 - P39	52	IS	30	30	0	17:01	17:06	P		P 43 - N. EOS	
08/22/09	P40 - P43	22.5	IS	30	30	0	17:31	17:36	P		P 39 - P 74	
08/22/09	P74 - P40	10	IS	30	30	0	17:20	17:25	P		P 43 - P 42	
08/22/09	P42 - P40	31	IS	30	30	0	17:12	17:17	P		P 74 - P 41	
08/22/09	P41 - P40	41	IS	30	30	0	17:14	17:19	P		P 42 - N. EOS	
08/22/09	P42 - P41	31	IS	30	30	0	17:13	17:18	P		P 40 - E. EOS	
08/22/09	P74 - P42	15	IS	30	30	0	17:21	17:26	P		P 40 - E. EOS	
08/22/09	P74 - P43	10	IS	30	30	0	17:30	17:35	P		P 40 - E. EOS	
08/22/09	P43 - P44	300	IS	30	30	0	15:23	15:28	P		P 74 - E. EOS	
08/22/09	P43 - P44	15	IS	30	30	0	15:20	15:25	P		P74 - P 74	
08/22/09	P43 - P44	72	IS	30	30	0	15:21	15:20	P		P 74 - P 45	
08/22/09	P45 - P44	22.5	IS	30	30	0	13:31	13:36	P		P 43 - P 46	
08/22/09	P43 - P45	61	IS	30	30	0	13:30	13:35	P		P 44 - P 16	
08/22/09	P17 - P43	22.5	IS	30	30	0	13:20	13:25	P		P 18 - P 16	
08/22/09	P16 - P45	14	IS	30	30	0	13:21	13:26	P		P 17 - P 15	

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Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section	
				Pressure			Time		P/F		From - To	
				Start	End	+/-	Start	End				
08/22/09	P15 - P45	7	IS	30	30	0	13:23	13:28	P		P 16 - P 46	
08/22/09	P15 - P46	14.5	IS	30	30	0	13:24	13:29	P		P 45 - P 14	
08/22/09	P14 - P46	7	IS	30	30	0	13:26	13:31	P		P 15 - P 49	
08/22/09	P14 - P49	14.5	IS	30	30	0	18:20	18:25	P		P 46 - P 13	
08/22/09	P13 - P49	7	IS	30	30	0	18:22	18:27	P		P 14 - P 50	
08/22/09	P13 - P50	14.5	IS	30	30	0	18:31	18:36	P		P 49 - P 12	
08/22/09	P12 - P50	7	IS	30	30	0	18:30	18:35	P		P 13 - P52	
08/22/09	P12 - P52	14.5	IS	30	30	0	18:45	18:50	P		P 50 - P 11	
08/22/09	P11 - P52	7	IS	30	30	0	18:46	18:51	P		P 12 - P 53	
08/22/09	P11 - P53	14.5	IS	30	30	0	18:50	18:55	P		P 52 - P 10	
08/22/09	P10 - P53	7	IS	30	30	0	18:51	18:50	P		P 11 - P 55	
08/22/09	P45 - P46	62.5	IS	30	30	0	14:10	14:15	P		P 15 - P 44	
08/22/09	P44 - P46	138	IS	30	30	0	14:05	14:10	P		P 45 - P 47	
08/22/09	P44 - P47	280	IS	30	30	0	18:15	18:20	P		P 46 - E. EOS	
08/22/09	P46 - P47	22.5	IS	30	30	0	18:07	18:12	P		P 44 - P 49	
08/22/09	P47 - P49	235	IS	30	30	0	18:05	18:10	P		P 46 - P 48	
08/22/09	P49 - P48	22.5	IS	30	30	0	17:56	18:01	P		P 47 - P 50	
08/22/09	P47 - P48	165	IS	30	30	0	17:55	18:00	P		P 49 - E. EOS	
08/22/09	P48 - P50	45	IS	30	30	0	17:58	18:03	P		P 49 - P 51	
08/22/09	P48 - P51	107	IS	30	30	0	17:36	17:41	P		P 50 - E. EOS	
08/22/09	P50 - P51	22.5	IS	30	30	0	17:46	17:51	P		P 48 - P 52	
08/22/09	P51 - P52	91	IS	30	30	0	17:45	17:50	P		P 50 - E. EOS	
08/22/09	P49 - P50	233.5	IS	30	30	0	18:35	18:40	P		P 13 - P 51	
08/22/09	P50 - P52	279.5	IS	30	30	0	18:40	18:45	P		P 12 - P 51	
08/22/09	P52 - P54	323.5	IS	30	30	0	19:02	19:07	P		P 53 - E. EOS	

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Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section
				Pressure			Time		P/F		From - To
				Start	End	+/-	Start	End			
08/22/09	P53 - P54	22.5	IS	30	30	0	18:25	18:30	P		P 52 - P 55
08/22/09	P52 - P53	30	IS	30	30	0	19:00	19:05	P		P 11 - P 54
08/23/09	P53 - P55	30	IS	30	30	0	11:46	11:51	P		P 10 - P 54
08/23/09	P54 - P55	193.5	IS	30	30	0	11:45	11:50	P		P 53 - E. EOS
08/23/09	P55 - P56	58	IS	30	30	0	11:15	11:20	P		P 57 - E. EOS
08/23/09	P57 - P56	22.5	IS	30	30	0	11:08	11:13	P		P 53 - P 58
08/23/09	P58 - P56	58	IS	30	30	0	11:06	11:11	P		P57 - E. EOS
08/23/09	P58 - P57	165.5	IS	30	30	0	11:05	11:10	P		P 8 - P 56
08/23/09	P10 - P55	20	IS	30	30	0	11:30	11:35	P		P 53 - P 9
08/23/09	P55 - P57	165.5	IS	30	30	0	11:35	11:40	P		P 9 - P 56
08/23/09	P59 - P58	38	IS	30	30	0	10:45	10:50	P		P 60 - E. EOS
08/23/09	P60 - P58	198	IS	30	30	0	10:40	10:45	P		P 59 - P 7
08/23/09	P60 - P59	22.5	IS	30	30	0	10:31	10:30	P		P 58 - P 61
08/23/09	P61 - P59	98	IS	30	30	0	10:34	10:39	P		P 60 - E. EOS
08/23/09	P61 - P60	198	IS	30	30	0	10:30	10:35	P		P 59 - P 6
08/23/09	P8 - P58	20	IS	30	30	0	11:25	11:30	P		P 7 - P 57
08/23/09	P7 - P60	19	IS	30	30	0	9:05	9:10	P		P 6 - P 58
08/23/09	P6 - P61	20	IS	30	30	0	9:07	9:12	P		P 5 - P 60
08/23/09	P70 - P61	12	IS	30	30	0	9:00	9:05	P		P 5 - P 62
08/23/09	P5 - P70	22.5	IS	30	30	0	9:10	9:15	P		P 4 - P 61
08/23/09	P64 - P70	12	IS	30	30	0	8:50	8:55	P		P 4 - P 62
08/23/09	P70 - P62	22.5	IS	30	30	0	8:51	8:50	P		P 61 - P 64
08/23/09	P62 - P61	269	IS	30	30	0	9:55	10:00	P		P 70 - E. EOS
08/23/09	P64 - P62	13	IS	30	30	0	8:52	8:57	P		P 70 - P 63
08/23/09	P63 - P62	235	IS	30	30	0	9:50	9:55	P		P 64 - E. EOS

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Geomembrane Non-Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management

Contractor: Grayco

Project Name: Cell 3 CQA

Address: Two Pine Class 1 Landfill

Location: North Little Rock, Arkansas

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Date	Seam Number	Seam Length (ft)	Tester Initials	Air Testing						Vacuum Box P/F	Seam Section From - To
				Pressure			Time		P/F		
				Start	End	+/-	Start	End			
08/23/09	P64 - P63	22.5	IS	30	30	0	8:25	8:30	P		P 62 - P 65
08/23/09	P4 - P64	20	IS	30	30	0	9:15	9:20	P		P 3 - P 70
08/23/09	P65 - P64	23.5	IS	30	30	0	8:26	8:31	P		P 3 - P 63
08/23/09	P65 - P63	221	IS	30	30	0	9:30	9:35	P		P 64 - E. EOS
08/23/09	P3 - P65	20	IS	30	30	0	9:17	9:22	P		P 2 - P 64
08/23/09	P66 - P65	225	IS	30	30	0	10:15	10:20	P		P 2 - E. EOS
08/23/09	P2 - P66	20	IS	30	30	0	7:46	7:51	P		P 1 - P 65
08/23/09	P67 - P66	11.5	IS	30	30	0	7:43	7:48	P		P 1 - P 68
08/23/09	P1 - P67	20	IS	30	30	0	7:45	7:50	P		P 66 - EXT
08/23/09	P67 - P68	22	IS	30	30	0	7:41	7:46	P		P 66 - EXT
08/23/09	P68 - P66	101.5	IS	30	30	0	7:40	7:45	P		P 67 - E. EOS
08/23/09	P69 - P68	58	IS	30	30	0	13:30	13:35	P		EXT - E. EOS
08/23/09	P9 - P57	20	IS	30	30	0	11:36	11:41	P		P 8 - P 55
08/23/09	P55 - P71	12.5	IS	30	30	0	14:30	14:35	P		P 54 - P 56
08/23/09	P54 - P71	105	IS	30	30	0	14:23	14:28	P		P 55 - E. EOS
08/23/09	P56 - P71	10	IS	30	30	0	14:35	14:40	P		P 55 - P 72
08/23/09	P56 - P72	12.6	IS	30	30	0	15:11	15:16	P		P 58 - P 71
08/23/09	P58 - P72	10	IS	30	30	0	15:10	15:15	P		P 56 - P 73
08/23/09	P72 - P71	101	IS	30	30	0	15:28	15:33	P		P 56 - E. EOS
08/23/09	P72 - P73	71	IS	30	30	0	14:11	14:16	P		P 58 - AT
08/23/09	P73 - P59	70	IS	30	30	0	14:05	14:10	P		P 58 - AT
08/23/09	P46 - P49	133.5	IS	30	30	0	18:06	18:11	P		P 14 - P 47
08/23/09	EXT - P67	14.5	IS	30	30	0	13:31	13:35	P		P 1 - P 68
08/23/09	EXT - P68	118	IS	30	30	0	13:42	13:47	P		P 67 - P 69
08/23/09	EXT - P69	32	IS	30	30	0	13:40	13:45	P		P 68 - AT

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AT = Anchor Trench

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APPENDIX R
GEOMEMBRANE DESTRUCTIVE TEST LOG
SUMMARY AND LABORATORY TEST RESULTS

Geomembrane Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management
 Contractor: Grayco
 Project Name: Cell 3 CQA
 Address: Two Pine Class 1 Landfill
 Location: North Little Rock, Arkansas

Project Number: 35097116
 CQA Monitor: Joe Smith
 Reviewed By: Brad Fureigh, E.I.
 Approved By: Ken Bown, P.E.
 Liner Installer: TEP

Destructive Testing Specifications	
Peel Extrusion =	78
Shear Extrusion =	98
Peel Fusion =	121
Shear Fusion =	121

Date	Sample ID	Seam Number	Machine Number	Seamer Initials	Test Values lbs/inch										Field Pass/Fail	Lab Pass/Fail	Comments	
8/19/09	DS-1	1-2	21	MT	P	120	117	122	112	117	116	111	118	120	138	Pass	Pass	30' W of E.EOS
					S	163		168		167		167		164				
8/19/09	DS-2	2-3	23	SP	P	119	134	117	126	117	137	114	124	120	116	Pass	Pass	30' W of E.EOS
					S	171		176		174		172		174				
8/19/09	DS-3	3-4	22	RH	P	114	121	112	122	120	118	119	118	126	127	Pass	Pass	30' W of E.EOS
					S	161		158		162		160		164				
8/19/09	DS-4	4-5	24	AG	P	115	112	112	114	122	117	119	122	117	113	Pass	Pass	30' W of E.EOS
					S	160		157		156		154		166				
8/19/09	DS-5	5-6	24	AG	P	117	112	119	116	124	115	120	113	123	118	Pass	Pass	42' W of E.EOS
					S	158		158		156		160		158				
8/21/09	DS-6	6-7	24	AG	P	119	115	116	132	129	114	112	137	134	176	Pass	Pass	42' W of E.EOS
					S	184		180		182		186		181				
8/21/09	DS-7	7-8	24	AG	P	140	132	114	136	135	142	119	138	136	121	Pass	Pass	50' W of E.EOS
					S	192		196		199		189		197				
8/21/09	DS-8	9-8	22	RH	P	132	133	130	138	133	134	131	128	122	138	Pass	Pass	50' W of E.EOS
					S	171		179		170		168		178				
8/21/09	DS-9	10-9	21	MT	P	114	116	128	137	114	105	120	111	140	129	Pass	Pass	50' W of E.EOS
					S	173		176		175		170		174				
8/21/09	DS-10	11-10	23	SP	P	130	128	116	132	119	120	130	116	128	120	Pass	Pass	50' W of E.EOS
					S	168		177		171		174		166				
8/21/09	DS-11	12-11	24	AG	P	118	116	134	131	126	121	117	126	136	135	Pass	Pass	50' W of E.EOS
					S	170		172		170		168		166				
8/21/09	DS-12	13-12	22	RH	P	127	109	130	133	126	111	136	116	123	138	Pass	Pass	50' W of E.EOS
					S	171		168		173		174		172				
8/21/09	DS-13	14-13	21	MT	P	126	124	119	120	124	122	126	122	128	130	Pass	Pass	50' W of E.EOS
					S	168		164		164		167		165				
8/23/09	DS-14	15-14	23	SP	P	141	133	130	135	123	131	122	130	121	124	Pass	Pass	50' W of E.EOS
					S	163		171		181		168		164				
8/23/09	DS-15	16-15	22	RH	P	112	110	114	104	106	118	117	112	115	110	Pass	Pass	50' W of E.EOS
					S	161		164		174		162		164				

Geomembrane Destructive Test Log Summary



25809 Interstate 30 South

Bryant, AR 72022

Phone: 501.847.9292

Fax: 501.847.9210

Client Name: Waste Management
 Contractor: Grayco
 Project Name: Cell 3 CQA
 Address: Two Pine Class 1 Landfill
 Location: North Little Rock, Arkansas

Project Number: 35097116
 CQA Monitor: Joe Smith
 Reviewed By: Brad Fureigh, E.I.
 Approved By: Ken Bown, P.E.
 Liner Installer: TEP

Destructive Testing Specifications	
Peel Extrusion =	78
Shear Extrusion =	98
Peel Fusion =	121
Shear Fusion =	121

Date	Sample ID	Seam Number	Machine Number	Seamer Initials	Test Values lbs/inch										Field Pass/Fail	Lab Pass/Fail	Comments	
8/23/09	DS-16	17-16	22	RH	P	130	129	131	134	116	132	134	133	109	126	Pass	Pass	50' W OF P 43
					S	168		164		170		162		171				
8/23/09	DS-17	18-17	21	MT	P	130	132	128	130	124	130	112	114	130	128	Pass	Pass	50' W OF P 20
					S	172		167		169		170		165				
8/23/09	DS-18	19-18	24	AG	P	130	129	132	131	140	134	138	142	138	144	Pass	Pass	50' W OF P 20
					S	167		164		162		160		168				
8/23/09	DS-19	27-43	24	AG	P	142	145	144	138	140	138	140	136	136	142	Pass	Pass	9' FROM P 43
					S	171		174		170		164		176				
8/23/09	DS-20	37-36	22	RH	P	123	132	124	114	112	110	117	113	130	140	Pass	Pass	21.5 FROM P 43
					S	158		162		163		154		161				
8/23/09	DS-21	32-43	24	AG	P	122	134	120	119	124	123	113	126	128	110	Pass	Pass	8.5' FROM P 30
					S	154		157		154		159		155				
8/23/09	DS-22	43-44	21	MT	P	148	150	140	138	151	148	154	147	144	142	Pass	Pass	289' FROM EOS
					S	172		169		167		177		167				
8/23/09	DS-23	44-47	21	MT	P	118	120	121	114	112	108	104	111	120	124	Pass	Pass	71' FROM AT
					S	151		154		153		149		146				
8/23/09	DS-24	49-50	21	MT	P	121	126	118	114	134	119	114	131	133	135	Pass	Pass	50' FROM P 13
					S	179		176		176		174		170				
8/23/09	DS-25	50-52	23	SP	P	138	130	133	132	131	138	134	119	136	138	Pass	Pass	50' FROM P 12
					S	178		180		182		184		181				
8/23/09	DS-26	52-54	24	AG	P	134	137	130	117	140	137	130	126	134	134	Pass	Pass	20' FROM P 53
					S	170		174		173		169		175				
8/23/09	DS-27	55-57	24	AG	P	134	129	140	138	136	118	137	138	116	130	Pass	Pass	50' FROM P 9
					S	158		154		148		156		166				
8/23/09	DS-28	60-58	22	RH	P	140	143	134	140	132	116	131	114	136	138	Pass	Pass	50' FROM P 7
					S	167		164		163		163		166				
8/23/09	DS-29	62-61	22	RH	P	130	135	138	141	115	140	146	136	136	141	Pass	Pass	50' FROM P 70
					S	158		167		161		156		162				
8/23/09	DS-30	65-63	21	MT	P	130	114	118	112	112	120	121	124	120	119	Pass	Pass	30' FROM P 64
					S	164		171		162		161		173				

Terracon

Bryant, AR 72022

Fax: 501.847.9210

Project Number: 35097116

CQA Monitor: Joe Smith

Reviewed By: Brad Fureigh, E.I.

Approved By: Ken Bown, P.E.

Liner Installer: TEP

Peel Extrusion =	78

Shear Extrusion = 98

$$\text{Peel Fusion} = \frac{121}{100}$$

Shear Fusion = 121

[illegible]



August 20, 2009

Mail To:

Attn: Mr. Brad Fureigh
Terracon Consultants
25809 Interstate 30
Bryant, AR 72022

E-mail: bnfureigh@terracon.com
CC E-mail: dconrad@wm.com

Bill To:

Attn: Mr. Dave Conrad
Waste Management, Inc.
100 Two Pine Drive
North Little Rock, AR 72117

Terracon Project # : 35097116

Dear Mr. Fureigh:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Two Pine - Cell 3**

TRI Job Reference Number: E2333-43-07

Material(s) Tested: 5 Heat Fusion Weld Seam(s)

Test(s) Requested: SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54)

Codes

AD	Adhesion failure (100% Peel)
BRK	Break in sheeting away from Seam edge
SE	Break in sheeting at edge of seam
AD-BRK	Break in sheeting after some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film tearing bond (all non "AD" failures)
NON-FTB	100% peel

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melissa Hunter
Project Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-43-07

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-1								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	135	140	142	130	133	136	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	141	148	139	146	145	144	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		192	197	195	192	189	193	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-2								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	135	155	153	135	123	140	90 min
	Peel Incursion (%)	<10	<10	<10	<10	50		
	Peel Locus of Failure Code	SE	SE	SE	SE	AD-BRK		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	135	148	143	138	143	141	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		193	193	194	197	198	195	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-43-07

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-3								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	151	156	153	156	141	151	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	145	146	151	160	144	149	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		185	191	183	184	182	185	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-4								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	148	142	134	137	138	140	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	132	138	145	139	139	139	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		190	192	189	197	188	191	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-43-07

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-5								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	144	133	138	133	134	136	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	139	135	135	137	130	135	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	186	184	193	186	186	187	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

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August 22, 2009

Mail To:

Attn: Mr. Brad Fureigh
Terracon Consultants
25809 Interstate 30
Bryant, AR 72022

E-mail: bnfureigh@terracon.com
CC E-mail: dconrad@wm.com

Bill To:

Attn: Mr. Dave Conrad
Waste Management, Inc.
100 Two Pine Drive
North Little Rock, AR 72117

Terracon Project # : 35097116

Dear Mr. Fureigh:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Two Pine - Cell 3**

TRI Job Reference Number: E2333-48-09

Material(s) Tested: 8 Heat Fusion Weld Seam(s)

Test(s) Requested: SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54)

Codes

AD	Adhesion failure (100% Peel)
BRK	Break in sheeting away from Seam edge
SE	Break in sheeting at edge of seam
AD-BRK	Break in sheeting after some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film tearing bond (all non "AD" failures)
NON-FTB	100% peel

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Jennifer Tenney
Project Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-48-09

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-6								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	148	136	147	154	151	147	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	131	133	116	142	114	127	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		198	193	187	189	186	191	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-7								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	156	153	154	151	157	154	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	127	124	128	129	134	128	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		199	200	199	202	206	201	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-48-09

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-8								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	153	166	157	154	153	157	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	149	154	150	156	154	153	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	196	192	190	190	192	192	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		
Sample ID: DS-9								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	140	140	136	141	147	141	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	127	127	127	130	136	129	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	197	191	191	192	188	192	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-48-09

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-10								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	121	137	134	117	119	126	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	145	158	146	148	149	149	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		192	201	189	190	187	192	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-11								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	152	158	148	149	143	150	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	143	155	141	152	144	147	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		195	194	204	199	197	198	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-48-09

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-12								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	144	130	152	142	143	Peel A 142	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	169	161	163	175	154	Peel B 164	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		195	196	191	195	199	Shear 195	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-13								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	171	173	162	155	163	Peel A 165	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	155	152	145	147	147	Peel B 149	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		199	198	200	214	205	Shear 203	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



August 25, 2009

Mail To:

Attn: Mr. Brad Fureigh
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25809 Interstate 30
Bryant, AR 72022

E-mail: bnfureigh@terracon.com
CC E-mail: dconrad@wm.com

Bill To:

Attn: Mr. Dave Conrad
Waste Management, Inc.
100 Two Pine Drive
North Little Rock, AR 72117

Terracon Project # : 35097116

Dear Mr. Fureigh:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Two Pine - Cell 3**

TRI Job Reference Number: E2333-54-06

Material(s) Tested: 20 Heat Fusion Weld Seam(s)
1 Single Extrusion Weld Seam(s)

Test(s) Requested: SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54)

Codes

AD	Adhesion failure (100% Peel)
BRK	Break in sheeting away from Seam edge
SE	Break in sheeting at edge of seam
AD-BRK	Break in sheeting after some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film tearing bond (all non "AD" failures)
NON-FTB	100% peel

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Melissa Hunter
Project Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-14								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	138	136	148	148	128	Peel A 140	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	145	143	139	145	140	Peel B 142	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		193	189	190	187	190	190	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-15								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	148	142	145	133	154	Peel A 144	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	134	126	144	134	137	Peel B 135	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		185	182	181	176	181	181	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-16								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	98	137	99	137	127	Peel A 120	90 min
	Peel Incursion (%)	25	<10	25	<10	<10		
	Peel Locus of Failure Code	AD-BRK	SE	AD-BRK	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	154	165	164	142	140	Peel B 153	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		199	194	193	191	200	Shear 195	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-17								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	148	133	126	136	116	Peel A 132	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	115	114	120	116	138	Peel B 121	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		184	181	182	181	184	Shear 182	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-18								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	145	146	147	149	146	147	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	133	135	137	131	138	135	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		180	181	178	180	179	180	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-19								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	122	122	125	127	124	124	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	139	139	144	148	146	143	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		191	192	186	185	189	189	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-20								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	152	148	149	150	156	151	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	149	153	150	149	143	149	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	181	181	181	178	179	180	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		
Sample ID: DS-21								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	159	134	142	151	155	148	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	146	144	147	150	143	146	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	184	184	180	179	183	182	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-22								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	135	144	122	141	132	135	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	130	127	122	114	141	127	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		198	197	198	192	195	196	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-23								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	136	128	138	139	134	135	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	122	122	122	120	124	122	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		196	189	187	195	195	192	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-24								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	146	151	144	137	140	144	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	128	119	125	120	121	123	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	182	183	183	177	181	181	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		
Sample ID: DS-25								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	151	152	145	152	155	151	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	157	150	147	144	139	147	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	183	180	179	178	179	180	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-26								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	148	152	153	145	148	Peel A 149	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	133	132	127	133	134	Peel B 132	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		185	184	186	183	183	Shear 184	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-27								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	155	160	152	150	156	Peel A 155	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	134	149	136	135	138	Peel B 138	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		189	188	189	187	188	Shear 188	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-28								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	145	146	142	143	144	144	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	144	143	144	148	147	145	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		181	181	179	180	181	180	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-29								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	150	141	137	135	143	141	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	149	143	149	151	150	148	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		180	179	175	187	178	180	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-30								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	134	131	135	142	138	136	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	125	125	121	128	125	125	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear								
Shear Strength (ppi)		194	195	187	187	193	191	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-31								
Weld: Single Extrusion								
Peel								
Peel Strength (ppi)		43	61	38	37	40	44	78 min
Peel Incursion (%)		100	40	100	100	100		
Peel Locus of Failure Code		AD	AD-BRK	AD	AD	AD		
Peel NSF Failure Code		NON-FTB	FTB	NON-FTB	NON-FTB	NON-FTB		
Shear								
Shear Strength (ppi)		185	181	180	177	181	181	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-32								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	156	151	148	161	153	154	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	136	133	148	138	140	139	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		184	181	182	184	186	183	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		
Sample ID: DS-33								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	139	149	142	157	145	146	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	143	139	149	147	154	146	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)		182	184	180	180	182	182	120 min
Shear Elongation @ Break (%)		>50	>50	>50	>50	>50		

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-54-06

PARAMETER		TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
		1	2	3	4	5		
Sample ID: DS-34								
Weld: Heat Fusion								
Side A	Peel Strength (ppi)	157	156	153	153	152	154	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Side B	Peel Strength (ppi)	147	145	144	139	140	143	90 min
	Peel Incursion (%)	<10	<10	<10	<10	<10		
	Peel Locus of Failure Code	SE	SE	SE	SE	SE		
	Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
	Shear Strength (ppi)	176	179	175	178	177	177	120 min
	Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

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August 27, 2009

Mail To:

Attn: Mr. Brad Fureigh
Terracon Consultants
25809 Interstate 30
Bryant, AR 72022

E-mail: bnfureigh@terracon.com
CC E-mail: dconrad@wm.com

Bill To:

Attn: Mr. Dave Conrad
Waste Management, Inc.
100 Two Pine Drive
North Little Rock, AR 72117

Terracon Project # : 35097116

Dear Mr. Fureigh:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Two Pine - Cell 3**

TRI Job Reference Number: E2333-61-06

Material(s) Tested: 2 Single Extrusion Weld Seam(s)

Test(s) Requested: SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54)

Codes

AD	Adhesion failure (100% Peel)
BRK	Break in sheeting away from Seam edge
SE	Break in sheeting at edge of seam
AD-BRK	Break in sheeting after some adhesion failure - partial peel
SIP	Separation in the plane of the sheet (leaving the bond intact)
FTB	Film tearing bond (all non "AD" failures)
NON-FTB	100% peel

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Jennifer Tenney
Project Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Waste Management, Inc.

Project: Two Pine - Cell 3

Material: 60 mil HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54)

TRI Log #: E2333-61-06

PARAMETER	TEST REPLICATE NUMBER					MEAN	PROJ SPEC.
	1	2	3	4	5		
Sample ID:	DS-31A						
Weld:	Single Extrusion						
Peel Strength (ppi)	138	130	156	124	106	131	78 min
Peel Incursion (%)	<10	<10	<10	<10	<10		
Peel Locus of Failure Code	SE	SE	SE	SE	SE		
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)	191	183	186	187	185	186	120 min
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		
Sample ID:	DS-31B						
Weld:	Single Extrusion						
Peel Strength (ppi)	144	129	131	147	156	141	78 min
Peel Incursion (%)	<10	<10	<10	<10	<10		
Peel Locus of Failure Code	SE	SE	SE	SE	SE		
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB		
Shear Strength (ppi)	192	182	185	181	184	185	120 min
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50		

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

APPENDIX S

GEOMEMBRANE REPAIR LOG SUMMARY

Geomembrane Repair Log Summary



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ Primary
☐ Secondary
☐ Other: _____

25809 Interstate 30 South
 Bryant, AR 72022
 Phone 501.847.9292
 Fax 501.847.9210

DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/19/09		EX - 1	10.0		1	P	E	15.0	8.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	32.5		2	P	E	15.0	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	55.0		3	P	E	3.0	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	77.5		4	P	E	2.0	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09	EX		100.0	WOB	5	P	E			1.0	26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	110.0		6	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	122.5		7	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	137.0		8	P	E	5.0	1.5		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	147.0		9	P	E	3.0	1.5		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	150.0		10	P	E	3.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	172.5		11	P	E	3.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	180.0		12	P	E	3.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	195.0		13	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	200.0		14	P	E	3.5	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	202.0		15	P	E	2.0	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	206.0	WOB	16	P	E			1.0	26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	224.5		17	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	247.0		18	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	269.5		19	P	E	2.5	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	292.0		20	P	E	1.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS

NOTES: (1) Repair No.: Repairs should be numbered sequentially
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Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ Primary
☐ Secondary
☐ Other: _____

25809 Interstate 30 South
 Bryant, AR 72022
 Phone 501.847.9292
 Fax 501.847.9210

DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/19/09		EX - 1	314.5		21	P	E	3.0	1.5		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	337.0		22	P	E	3.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	359.5		23	P	E	1.5	1.5		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	382.0		24	P	E	2.0	1.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	400.0		25	P	E	18.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	422.5		26	P	E	2.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	445.0		27	P	E	2.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	467.5		28	P	E	3.0	1.5		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	472.0		29	P	E	1.0	1.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	477.0		30	P	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		EX - 1	490.0		31	P	E	30.0	1.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		1-2	30.0	E. EOS	32	DS	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		2-3	30.0	E. EOS	33	DS	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		3-4	30.0	E. EOS	34	DS	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		4-5	30.0	E. EOS	35	DS	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		4-5	120.0	E. EOS	36	P	E	2.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		5-6	42.0	E. EOS	37	DS	E	5.0	2.0		25	LV	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		10-9	25.0	W. EOS	38	P	E	4.0	2.0		26	AR	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		2-3	40.0	E. EOS	39	P	E	3.0	1.0		25	MT	JWS	8/19/09	SP	PASS	VT	JWS
8/19/09		6-7	42.0	E. EOS	40	DS	E	5.0	2.0		25	MT	JWS	8/19/09	SP	PASS	VT	JWS

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Geomembrane Repair Log Summary



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Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ **Primary**
☐ **Secondary**
☐ **Other:** _____

25809 Interstate 30 South
 Bryant, AR 72022
 Phone 501.847.9292
 Fax 501.847.9210

DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/21/09		7-8	50.0	E. EOS	41	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		8-9	50.0	E. EOS	42	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		10-9	50.0	E. EOS	43	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		11-10	50.0	E. EOS	44	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		12-11	50.0	E. EOS	45	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		13-12	50.0	E. EOS	46	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/21/09		14-13	50.0	E. EOS	47	DS	E	5.0	2.0		25	MT	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		15-14	50.0	E. EOS	48	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		16-15	50.0	E. EOS	49	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		17-16	50.0	P43	50	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		18-17	50.0	P20	51	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		19-18	50.0	P20	52	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		18-19-20	50.0		53	P	E	2.0	1.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		17-18-20-43	50.0		54	P	E	2.0	1.5		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		20-21-43	50.0		55	P	E	1.5	1.5		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		21-22-43	50.0		56	P	E	2.5	1.5		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		22-23-43	50.0		57	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		23-24-43	50.0		58	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		24-25-43	50.0		59	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		25-26-43	50.0		60	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS

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Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
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Project Number: 35097116
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Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ **Primary**
☐ **Secondary**
☐ **Other:** _____

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DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/22/09		26-27-43			61	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		27-28-43			62	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		27-43	9.0	P43	63	DS	E	5.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		28-29-43			64	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		29-30-43			65	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		29-30-31			66	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		30-31-32			67	P	E	2.0	2.0		26	AR	JWS	8/21/09	SP	PASS	VT	JWS
8/22/09		30-32-43			68	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		32-43	8.5	P30	69	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		32-33-43			70	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		33-34-43			71	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		34-35-43			72	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		35-36-43			73	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		36-37-43			74	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		37-38-43			75	P	E	2.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		38-39-43			76	P	E	2.5	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		39-40-43			77	P	E	3.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		36-37	21.5	P43	78	DS	E	5.0	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		40-41-42			79	P	E	2.5	2.0		26	AR	JWS	8/22/09	SP	PASS	VT	JWS
8/22/09		40-42-73			80	P	E	1.5	1.5		26	AR	JWS	8/22/09	SP	PASS	VT	JWS

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	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/23/09		73-40-43			81	P	E	2.0	1.0		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		43-44	289.0	E. EOS	82	DS	E	5.0	2.0		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		43-44			83	P	E	3.5	1.5		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		43-44			84	P	E	2.5	1.0		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		43-44-45			85	P	E	2.5	2.0		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		43-45			86	P	E	1.0	1.0		26	AR	JWS	8/23/09	SP	PASS	VT	JWS
8/23/09		16-17-43-45			87	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		16-45			88	P	E	1.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		15-16-45			89	P	E	1.5	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		15-45-46			90	P	E	2.5	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		44-45-46			91	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		44-46-47			92	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		44-47	71.0	AT	93	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		47-43			94	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		46-47-49			95	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		14-15-46			96	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		14-46-49			97	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		13-14-49			98	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		13-49-50			99	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		49-50	50.0	P13	100	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS

NOTES: (1) Repair No.: Repairs should be numbered sequentially
 (2) Repair Codes.: P = Patch, C = Cap, S = Anchor Trench Ext., D = Destructive Sample, G = Grind and Weld, T = Topping along Fusion Seam
 (3) Repair Types: E = Extrusion and F = Fusion

ABBREVIATIONS:
 GV = Gas Vent AT = Anchor Trench
 EXT = Existing PP = Pipe Penetration

Geomembrane Repair Log Summary



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ **Primary**
☐ **Secondary**
☐ **Other:** _____

25809 Interstate 30 South
 Bryant, AR 72022
 Phone 501.847.9292
 Fax 501.847.9210

DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/23/09		48-49-50			101	P	E	1.5	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		48-50-51			102	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		50-51-52			103	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		50-52	50.0	P12	104	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		12-50-52			105	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		11-12-52			106	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		11-52-53			107	P	E	2.5	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		52-53-54			108	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		52-54	20.0	P53	109	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		10-11-53			110	P	E	2.5	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		10-53-55			111	P	E	3.0	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		53-54-55			112	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		9-10-55-57			113	P	E	5.0	2.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		55-57	50.0	P9	114	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		8-9-57-58			115	P	E	5.0	2.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		56-57-58			116	P	E	2.5	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		55-56-57			117	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		55-56-71			118	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		54-55-71			119	P	E	5.0	3.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		56-71-72			120	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS

NOTES: (1) Repair No.: Repairs should be numbered sequentially
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 (3) Repair Types: E = Extrusion and F = Fusion

ABBREVIATIONS:
 GV = Gas Vent AT = Anchor Trench
 EXT = Existing PP = Pipe Penetration

Geomembrane Repair Log Summary



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ Primary
☐ Secondary
☐ Other: _____

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DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE (3)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	CODE			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO	OPER ID		DATE	OPER ID	PASS/ FAIL	ACTION	QA ID
					(1)	(2)												
8/23/09		56-58-72			121	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		58-72-73			122	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		58-59-73			123	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		59-73	40.0	W. EOS	124	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		58-59-60			125	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		59-60-61			126	P	E	3.5	2.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		60-58	50.0	P7	127	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		7-8-58-60			128	P	E	4.0	4.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		6-7-60-61			129	P	E	5.0	3.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		61-60			130	P	E	3.0	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		62-61	50.0	P70	131	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		61-62-70			132	P	E	2.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		5-6-61-70			133	P	E	5.0	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		4-5-64-70			134	P	E	6.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		62-64-70			135	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		62-63-64			136	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		63-64-65			137	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		65-63	30.0	P64	138	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		3-4-64-65			139	P	E	6.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		2-3-65-66			140	P	E	6.0	4.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS

NOTES: (1) Repair No.: Repairs should be numbered sequentially
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ABBREVIATIONS:
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 EXT = Existing PP = Pipe Penetration

Geomembrane Repair Log Summary



Client Name: Waste Management
Contractor: Grayco
Project Name: Cell 3 CQA
Address: Two Pine Class 1 Landfill
Location: North Little Rock, Arkansas

Project Number: 35097116
CQA Monitor: Joe Smith
Reviewed By: Brad Fureigh, E.I.
Approved By: Ken Bown, P.E.
Liner Installer: TEP

Liner System

☒ Primary
☐ Secondary
☐ Other: _____

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DATE	LOCATION				REPAIR NO. AND CODE		REPAIR TYPE	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
											MACH NO	OPER ID						
	PANEL	SEAM	DIST (ft)	OFFSET (ft)	(1)	(2)		(3)	LENGTH (ft)	WIDTH (ft)	DIA (ft)				DATE	OPER ID	PASS/ FAIL	ACTION
8/23/09		1-2-66-67			141	P	E	7.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		1-R 141			142	DS	E	5.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		66-67-68			143	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-1-67			144	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-67-68			145	P	E	1.5	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	6.0		146	P	E	1.5	1.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	28.0		147	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	52.0		148	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	75.0		149	P	E	2.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	96.0		150	P	E	4.0	2.5		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		EX-68	107.0		151	P	E	5.0	5.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		68-69-EX			152	P	E	9.0	6.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		62-EX			153	P	E	31.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		66-68		AT	154	P	E	3.0	1.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		65-63		AT	155	P	E	3.0	2.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		54-59			156	C	E	53.0	67.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/23/09		71-SC-72		AT	157	C	E	55.0	23.0		26	AR	JWS	8/24/09	SP	PASS	VT	JWS
8/26/09		1-2-66-67			158	C	E	8.0	4.0		26	AR	JWS	8/26/09	SP	PASS	VT	JWS
8/26/09		W-R 158			159	DS	E	3.5	2.0		26	AR	JWS	8/26/09	SP	PASS	VT	JWS
8/26/09		E-R 158			160	DS	E	3.5	2.0		26	AR	JWS	8/26/09	SP	PASS	VT	JWS

NOTES: (1) Repair No.: Repairs should be numbered sequentially
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APPENDIX T
GEOCOMPOSITE MANUFACTURER'S QC
CERTIFICATES

March 11, 2009
Waste Management

Ref. : WM Two Pine Landfill, AR
Customer P.O. #
Transnet 200-2-8

We certify that the Transnet 200-2-8 drainage composite, meets the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Required Value	Qualifier
Geonet¹				
Mass per Unit Area	ASTM D 5261	lbs/ft ²	0.162	Minimum
Thickness	ASTM D 5199	mil	200	Minimum
Carbon Black	ASTM D 4218	%	2.0	Minimum
Tensile Strength	ASTM D 5035	lbs/in	45	Minimum
Melt Flow	ASTM D 1238 ³	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm ³	0.94	Minimum
Transmissivity ¹	ASTM D 4716	m ² /sec	2.0 x 10 ⁻³	Minimum
Composite				
Ply Adhesion	GRI GC7	lb/in	1.0	MARV ⁶
Transmissivity ²	ASTM D 4716	m ² /sec	1.0 x 10 ⁻⁴	MARV
Geotextile^{4 & 5}				
Fabric Weight	ASTM D 5261	oz/yd ²	8.0	MARV
Grab Strength	ASTM D 4632	lbs	225	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Tear Strength	ASTM D 4533	lbs	90	MARV
Water Flow Rate	ASTM D 4491	gpm/ft ²	100	MARV
AOS	ASTM D 4751	US Sieve	80	MARV
UV Resistance	ASTM D 4355	%/hrs	70/500	MARV

Notes:

- 1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.
- 2 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.
- 3 Condition 190/2.16
- 4 Geotextile and Geonet properties are prior to lamination.
- 5 Geotextile data is provided by the supplier.
- 6 MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.

Sincerely,

Nilay Patel

Nilay Patel
QA Manager

Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geocomposite manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m ² /sec)
			Top	Bottom	Minimum	Average	
1	310810001	310810001 - N	3108.04	3108.09	2.23	3.18	1.91 x 10 ⁻⁴
2	310810002	310810002 - N	3108.04	3108.09			
3	310810003	310810003 - N	3108.04	3108.09			
4	310810004	310810004 - N	3108.04	3108.09			
5	310810005	310810005 - N	3108.04	3108.09			
6	310810006	310810006 - N	3108.20	3108.01			
7	310810007	310810007 - N	3108.20	3108.01			
8	310810008	310810008 - N	3108.20	3108.01			
9	310810009	310810009 - N	3108.20	3108.01			
10	310810010	310810010 - N	3108.20	3108.01	2.35	3.37	
11	310810011	310810011 - N	3108.06	3108.18			
12	310810012	310810012 - N	3108.06	3108.18			
13	310810013	310810013 - N	3108.06	3108.18			
14	310810014	310810014 - N	3108.06	3108.18			
15	310810015	310810015 - N	3108.06	3108.18			
16	310810016	310810016 - N	3108.25	3108.12			
17	310810017	310810017 - N	3108.25	3108.12			
18	310810018	310810018 - N	3108.25	3108.12			
19	310810019	310810019 - N	3108.25	3108.12			
20	310810020	310810020 - N	3108.25	3108.12	2.17	3.12	
21	310810021	310810021 - N	3108.10	3108.23			
22	310810022	310810022 - N	3108.10	3108.23			
23	310810023	310810023 - N	3108.10	3108.23			
24	310810024	310810024 - N	3108.10	3108.23			
25	310810025	310810025 - N	3108.10	3108.23			1.87 x 10 ⁻⁴
26	310810026	310810026 - N	3108.15	3108.17			
27	310810027	310810027 - N	3108.15	3108.17			

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m ² /sec)
310810001 - N	CEFX54038	0.9543	0.179	213	2.33	67	2.16 x 10 ⁻³
310810002 - N	CEFX54038	0.9543					
310810003 - N	CEFX54038	0.9543					
310810004 - N	CEFX54038	0.9543					
310810005 - N	CEFX54038	0.9543					
310810006 - N	CEFX54038	0.9543					
310810007 - N	CEFX54038	0.9543					
310810008 - N	CEFX54038	0.9543					
310810009 - N	CEFX54038	0.9543					
310810010 - N	CEFX54038	0.9543	0.182	217	2.66	71	
310810011 - N	CEFX54038	0.9543					
310810012 - N	CEFX54038	0.9543					
310810013 - N	CEFX54038	0.9543					
310810014 - N	CEFX54038	0.9543					
310810015 - N	CEFX54038	0.9543					
310810016 - N	CEFX54038	0.9543					
310810017 - N	CEFX54038	0.9543					
310810018 - N	CEFX54038	0.9543					
310810019 - N	CEFX54038	0.9543					
310810020 - N	CEFX54038	0.9543	0.177	211	2.45	69	
310810021 - N	CEFX54038	0.9543					
310810022 - N	CEFX54038	0.9543					
310810023 - N	CEFX54038	0.9543					
310810024 - N	CEFX54038	0.9543					
310810025 - N	CEFX54038	0.9543					2.23 x 10 ⁻³
310810026 - N	CEFX54038	0.9543					
310810027 - N	CEFX54038	0.9543					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geocomposite manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m ² /sec)
			Top	Bottom	Minimum	Average	
1	310810028	310810028 - N	3108.15	3108.17			
2	310810029	310810029 - N	3108.15	3108.17			
3	310810030	310810030 - N	3108.15	3108.17	2.27	3.40	
4	310810031	310810031 - N	3108.03	3108.27			
5	310810032	310810032 - N	3108.03	3108.27			
6	310810033	310810033 - N	3108.03	3108.27			
7	310810034	310810034 - N	3108.03	3108.27			
8	310810035	310810035 - N	3108.03	3108.27			
9	310810036	310810036 - N	3108.19	3108.05			
10	310810037	310810037 - N	3108.19	3108.05			
11	310810038	310810038 - N	3108.19	3108.05			
12	310810039	310810039 - N	3108.19	3108.05			
13	310810040	310810040 - N	3108.19	3108.05	2.19	3.23	
14	310810041	310810041 - N	3108.13	3108.30			
15	310810042	310810042 - N	3108.13	3108.30			
16	310810043	310810043 - N	3108.13	3108.30			
17	310810044	310810044 - N	3108.13	3108.30			
18	310810045	310810045 - N	3108.13	3108.30			
19	310810046	310810046 - N	3108.22	3108.08			
20	310810047	310810047 - N	3108.22	3108.08			
21	310810048	310810048 - N	3108.22	3108.08			
22	310810049	310810049 - N	3108.22	3108.08			
23	310810050	310810050 - N	3108.22	3108.08	2.33	3.51	1.95 x 10 ⁻⁴
24	310810051	310810051 - N	3108.16	3108.26			
25	310810052	310810052 - N	3108.16	3108.26			
26	310810053	310810053 - N	3108.16	3108.26			
27	310810054	310810054 - N	3108.16	3108.26			

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m ² /sec)
310810028 - N	CEFX54038	0.9543					
310810029 - N	CEFX54038	0.9543					
310810030 - N	CEFX54038	0.9543	0.184	219	2.71	73	
310810031 - N	CEFX54038	0.9543					
310810032 - N	CEFX54038	0.9543					
310810033 - N	CEFX54038	0.9543					
310810034 - N	CEFX54038	0.9543					
310810035 - N	CEFX54038	0.9543					
310810036 - N	CEFX54038	0.9543					
310810037 - N	CEFX54038	0.9543					
310810038 - N	CEFX54038	0.9543					
310810039 - N	CEFX54038	0.9543					
310810040 - N	CEFX54038	0.9543	0.175	214	2.37	65	
310810041 - N	CEFX54038	0.9543					
310810042 - N	CEFX54038	0.9543					
310810043 - N	CEFX54038	0.9543					
310810044 - N	CEFX54038	0.9543					
310810045 - N	CEFX54038	0.9543					
310810046 - N	CEFX54038	0.9543					
310810047 - N	CEFX54038	0.9543					
310810048 - N	CEFX54038	0.9543					
310810049 - N	CEFX54038	0.9543					
310810050 - N	CEFX54038	0.9543	0.186	216	2.58	75	2.19 x 10 ⁻³
310810051 - N	CEFX54038	0.9543					
310810052 - N	CEFX54038	0.9543					
310810053 - N	CEFX54038	0.9543					
310810054 - N	CEFX54038	0.9543					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geocomposite manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m ² /sec)
			Top	Bottom	Minimum	Average	
1	310810055	310810055 - N	3108.16	3108.26			
2	310810056	310810056 - N	3108.24	3108.32			
3	310810057	310810057 - N	3108.24	3108.32			
4	310810058	310810058 - N	3108.24	3108.32			
5	310810059	310810059 - N	3108.24	3108.32			
6	310810060	310810060 - N	3108.24	3108.32	2.15	3.03	
7	310810061	310810061 - N	3108.02	3108.28			
8	310810062	310810062 - N	3108.02	3108.28			
9	310810063	310810063 - N	3108.02	3108.28			
10	310810064	310810064 - N	3108.02	3108.28			
11	310810065	310810065 - N	3108.02	3108.28			
12	310810066	310810066 - N	3108.39	3108.07			
13	310810067	310810067 - N	3108.39	3108.07			
14	310810068	310810068 - N	3108.39	3108.07			
15	310810069	310810069 - N	3108.39	3108.07			
16	310810070	310810070 - N	3108.39	3108.07	2.37	3.47	
17	310810071	310810071 - N	3108.14	3108.41			
18	310810072	310810072 - N	3108.14	3108.41			
19	310810073	310810073 - N	3108.14	3108.41			
20	310810074	310810074 - N	3108.14	3108.41			
21	310810075	310810075 - N	3108.14	3108.41			1.89 x 10 ⁻⁴
22	310810076	310810076 - N	3108.44	3108.31			
23	310810077	310810077 - N	3108.44	3108.31			
24	310810078	310810078 - N	3108.44	3108.31			
25	310810079	310810079 - N	3108.44	3108.31			
26	310810080	310810080 - N	3108.44	3108.31	2.21	3.17	
27	310810081	310810081 - N	3108.11	3108.46			

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m ² /sec)
310810055 - N	CEFX54038	0.9543					
310810056 - N	CEFX54038	0.9543					
310810057 - N	CEFX54038	0.9543					
310810058 - N	CEFX54038	0.9543					
310810059 - N	CEFX54038	0.9543					
310810060 - N	CEFX54038	0.9543	0.180	220	2.43	68	
310810061 - N	CEFX54038	0.9543					
310810062 - N	CEFX54038	0.9543					
310810063 - N	CEFX54038	0.9543					
310810064 - N	CEFX54038	0.9543					
310810065 - N	CEFX54038	0.9543					
310810066 - N	CEFX54038	0.9543					
310810067 - N	CEFX54038	0.9543					
310810068 - N	CEFX54038	0.9543					
310810069 - N	CEFX54038	0.9543					
310810070 - N	CEFX54038	0.9543	0.183	210	2.69	70	
310810071 - N	CEFX54038	0.9543					
310810072 - N	CEFX54038	0.9543					
310810073 - N	CEFX54038	0.9543					
310810074 - N	CEFX54038	0.9543					
310810075 - N	CEFX54038	0.9543					2.21 x 10 ⁻³
310810076 - N	CEFX54038	0.9543					
310810077 - N	CEFX54038	0.9543					
310810078 - N	CEFX54038	0.9543					
310810079 - N	CEFX54038	0.9543					
310810080 - N	CEFX54038	0.9543	0.178	215	2.49	72	
310810081 - N	CEFX54038	0.9543					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geocomposite manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m ² /sec)
			Top	Bottom	Minimum	Average	
1	310810082	310810082 - N	3108.11	3108.46			
2	310810083	310810083 - N	3108.11	3108.46			
3	310810084	310810084 - N	3108.11	3108.46			
4	310810085	310810085 - N	3108.11	3108.46			
5	310810086	310810086 - N	3108.21	3108.37			
6	310810087	310810087 - N	3108.21	3108.37			
7	310810088	310810088 - N	3108.21	3108.37			
8	310810089	310810089 - N	3108.21	3108.37			
9	310810090	310810090 - N	3108.21	3108.37	2.31	3.33	
10	310810091	310810091 - N	3108.29	3108.42			
11	310810092	310810092 - N	3108.29	3108.42			
12	310810093	310810093 - N	3108.29	3108.42			
13	310810094	310810094 - N	3108.29	3108.42			
14	310810095	310810095 - N	3108.29	3108.42			
15	310810096	310810096 - N	3108.40	3108.34			
16	310810097	310810097 - N	3108.40	3108.34			
17	310810098	310810098 - N	3108.40	3108.34			
18	310810099	310810099 - N	3108.40	3108.34			
19	310810100	310810100 - N	3108.40	3108.34	2.16	3.19	1.93 x 10 ⁻⁴
20	310810101	310810101 - N	3108.33	3108.48			
21	310810102	310810102 - N	3108.33	3108.48			
22	310810103	310810103 - N	3108.33	3108.48			
23	310810104	310810104 - N	3108.33	3108.48			
24	310810105	310810105 - N	3108.33	3108.48			
25	310810106	310810106 - N	3108.43	3108.36			
26	310810107	310810107 - N	3108.43	3108.36			
27	310810108	310810108 - N	3108.43	3108.36			

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m ² /sec)
310810082 - N	CEFX54038	0.9543					
310810083 - N	CEFX54038	0.9543					
310810084 - N	CEFX54038	0.9543					
310810085 - N	CEFX54038	0.9543					
310810086 - N	CEFX54038	0.9543					
310810087 - N	CEFX54038	0.9543					
310810088 - N	CEFX54038	0.9543					
310810089 - N	CEFX54038	0.9543					
310810090 - N	CEFX54038	0.9543	0.185	218	2.73	66	
310810091 - N	CEFX54038	0.9543					
310810092 - N	CEFX54038	0.9543					
310810093 - N	CEFX54038	0.9543					
310810094 - N	CEFX54038	0.9543					
310810095 - N	CEFX54038	0.9543					
310810096 - N	CEFX54038	0.9543					
310810097 - N	CEFX54038	0.9543					
310810098 - N	CEFX54038	0.9543					
310810099 - N	CEFX54038	0.9543					
310810100 - N	CEFX54038	0.9543	0.181	212	2.23	74	2.15 x 10 ⁻³
310810101 - N	CEFX54038	0.9543					
310810102 - N	CEFX54038	0.9543					
310810103 - N	CEFX54038	0.9543					
310810104 - N	CEFX54038	0.9543					
310810105 - N	CEFX54038	0.9543					
310810106 - N	CEFX54038	0.9543					
310810107 - N	CEFX54038	0.9543					
310810108 - N	CEFX54038	0.9543					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8**Project : WM Two Pine Landfill, AR**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m ² /sec)
			Top	Bottom	Minimum	Average	
1	310810109	310810109 - N	3108.43	3108.36			
2	310810110	310810110 - N	3108.43	3108.36	2.34	3.55	
3	310810111	310810111 - N	3108.35	3108.45			
4	310810112	310810112 - N	3108.35	3108.45			
5	310810113	310810113 - N	3108.35	3108.45			
6	310810114	310810114 - N	3108.35	3108.45			
7	310810115	310810115 - N	3108.35	3108.45			
8	310810116	310810116 - N	3108.47	3108.38			
9	310810117	310810117 - N	3108.47	3108.38			
10	310810118	310810118 - N	3108.47	3108.38			
11	310810119	310810119 - N	3108.47	3108.38			
12	310810120	310810120 - N	3108.47	3108.38	2.22	3.25	

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Product : TN200-2-8
Project : WM Two Pine Landfill, AR

We, the Geonet Manufacturer, hereby certify the following for the material sent to the above referenced project :

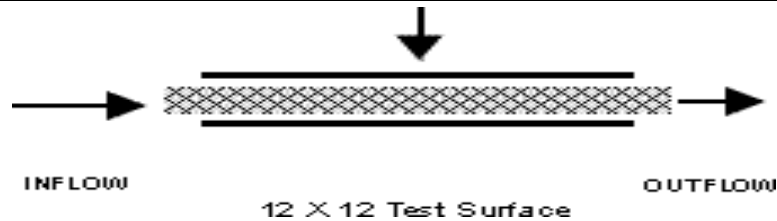
Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft ²)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m ² /sec)
310810109 - N	CEFX54038	0.9543					
310810110 - N	CEFX54038	0.9543	0.188	214	2.56	68	
310810111 - N	CEFX54038	0.9543					
310810112 - N	CEFX54038	0.9543					
310810113 - N	CEFX54038	0.9543					
310810114 - N	CEFX54038	0.9543					
310810115 - N	CEFX54038	0.9543					
310810116 - N	CEFX54038	0.9543					
310810117 - N	CEFX54038	0.9543					
310810118 - N	CEFX54038	0.9543					
310810119 - N	CEFX54038	0.9543					
310810120 - N	CEFX54038	0.9543	0.176	220	2.47	72	

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.



Client: Waste Management
Project: WM Two Pine Landfill, AR
Product: TN200-2-8

Job # 3108

Test Configuration:**Test Information:**

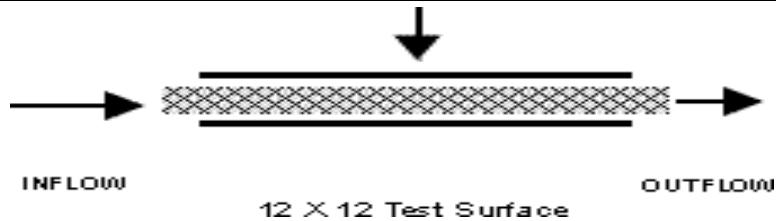
Boundary Conditions:	Steel Plate	Normal Load: 10000 psf
	Geocomposite	Gradient: 1.0 ft
	Steel Plate	Seating Time: 15 minutes
		Flow Direction: MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m ² /sec
			15 minutes
310810001	10000	1.0	1.91 x 10 ⁻⁴
310810025			1.87 x 10 ⁻⁴
310810050			1.95 x 10 ⁻⁴
310810075			1.89 x 10 ⁻⁴
310810100			1.93 x 10 ⁻⁴

Client: Waste Management
Project: WM Two Pine Landfill, AR
Product: TN200-2-8

Job # 3108

Test Configuration:**Test Information:**

Boundary Conditions: Steel Plate
Geonet
Steel Plate

Normal Load: 10000 psf
Gradient: 1.0 ft
Seating Time: 15 minutes
Flow Direction: MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m ² /sec
			15 minutes
310810001 - N	10000	1.0	2.16 x 10 ⁻³
310810025 - N			2.23 x 10 ⁻³
310810050 - N			2.19 x 10 ⁻³
310810075 - N			2.21 x 10 ⁻³
310810100 - N			2.15 x 10 ⁻³



POLYETHYLENE RESIN CERTIFICATION

Customer Name : Waste Management
Project Name : WM Two Pine Landfill, AR
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN200-2-8

We, the Geonet Manufacturer, hereby certify the following for the material delivered to the above referenced project:

Resin Supplier	Resin Production Plant	Resin Brand Name	Resin Lot Number	Property	Test Method	Units	Resin Supplier Value	Tested Value*
Matrix Polymers	Formosa, TX	HDPE	CEFX54038	Density	ASTM D 1505	gm/cc	0.952	0.950
				Melt Flow Index	ASTM D 1238 ^(a)	gm/10 min	0.16	0.16

(a) Condition 190/2.16

* Data from SKAPS Quality Control





**Engineered Synthetic
Products, Inc.**

Product : TN200-2-8

Project : WM Two Pine Landfill, AR

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

GEOCOMP ROLL#	FABRIC ROLL#	WEIGHT oz/sq yd	MD TENSILE lbs.	MD ELONG %	XMD TENSILE lbs.	XMD ELONG %	MD TRAP lbs.	XMD TRAP lbs.	AOS us sieve	WATER- FLOW gpm/sq f
310810001	3108.04	8.14	229	69	235	78	97	106	80	104
	3108.09	8.55	233	73	243	82	97	106	80	104
310810025	3108.10	8.23	231	65	237	80	101	112	80	104
	3108.23	8.12	225	67	239	77	99	108	80	104
310810050	3108.22	8.12	225	67	239	77	99	108	80	104
	3108.08	8.55	233	73	243	82	97	106	80	104
310810075	3108.14	8.23	231	65	237	80	101	112	80	104
	3108.41	8.18	232	68	240	75	95	104	80	104
310810100	3108.40	8.18	232	68	240	75	95	104	80	104
	3108.34	8.28	227	66	230	79	103	116	80	104

SKAPS INDUSTRIES

571 INDUSTRIAL PKWY, COMMERCE, GA 30529

ROLL NO

316010462

PRODUCT CODE

TN 280-2-8

NET NO

316010462-N

FABRIC

8 OZ

WIDTH LENGTH FOOTAGE

14

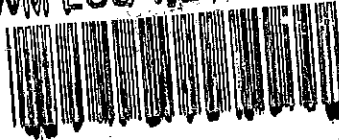
200

2800

WEIGHT

1076

WM ECO VISTA LF,AR



TRANSNET

316010462

SKAPS INDUSTRIES

571 INDUSTRIAL PKWY, COMMERCE, GA 30529

ROLL NO

316010457

PRODUCT CODE

TN 280-2-8

NET NO

316010457-N

FABRIC

8 OZ

WIDTH LENGTH FOOTAGE

14

200

2800

WEIGHT

1075

WM ECO VISTA LF,AR



TRANSNET

316010457

APPENDIX U
GEOCOMPOSITE CONFORMANCE TEST
RESULTS



March 27, 2009
August 3, 2009 Corrected Spec

Mail To:

**Mr. David Conrad
Waste Management, Inc.**

Bill To:

<= Same

email: dconrad@wm.com
ccemail: bnfutureigh@terracon.com

Dear Mr. Conrad:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Two Pines Cell 3**

TRI Job Reference Number: E2324-69-04

Material(s) Tested: 4 SKAPS TN200-2-8 Double Sided Geocomposite(s)

Test(s) Requested: Transmissivity (ASTM D 4716) - GC
Peel Strength (ASTM D 413, mod.) - GC
Thickness (ASTM D 5199) - GC, GN, GT
Mass/Unit Area (ASTM D 5261) - GC, GT
Density (ASTM D 1505) - GN
Carbon Content (ASTM D 1603, mod.) - GN
Tensile (ASTM D 7179) - GN
Grab Tensile (ASTM D 4632) - GT
Puncture Strength (ASTM D 4833) - GT
Trapezoidal Tear (ASTM D 4533) - GT
Mullen Burst (ASTM D 3786) - GT
Apparent Opening Size (ASTM D 4751) - GT
Permittivity (ASTM D 4491) - GT

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager



GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810001
TRI Log #: E2324-69-04

PARAMETER		TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.				
		1	2	3	4	5	6	7	8	9	10							
Hydraulic Transmissivity (ASTM D 4716)																		
Direction Tested: Machine Direction																		
Normal Load (psf):		10,000																
Hydraulic Gradient:		1.0																
Test Length (in)		12																
Test Width (in)		12																
Plate / Sample / Plate																		
Seat Time (hours)		Specimen																
		1					2											
0.25	Volume (cc)	1967	1995	1992	2232	2241	2232								9.90	0.10		
	Time (s)	3.19	3.22	3.21	3.55	3.56	3.53								2.05E-03	2.10E-05	1.0E-4 min	
	Flow Rate (GPM/ft width)	9.77	9.82	9.84	9.97	9.98	10.02											
	Transmissivity (m^2/s)	2.02E-03	2.03E-03	2.04E-03	2.06E-03	2.07E-03	2.07E-03											
	Test Temp (C)	20.0					20.0											
Temp. Corr. Factor		1.000					1.000											
Peel Strength (ASTM D 413, mod.)																		
A - MD Average Peel Strength (ppi)		2.9	4.0	4.4	5.2	5.7						4.4	1.1	1.0 min				
A - MD Average Peel Strength (g/in)		1317	1816	1998	2361	2588						2016	494					
B - MD Average Peel Strength (ppi)		4.8	4.1	4.8	2.1	4.0						4.0	1.1	1.0 min				
B - MD Average Peel Strength (g/in)		2179	1861	2179	953	1816						1798	502					
Note: A and B represent a randomly assigned top and bottom of the sample																		
Thickness (ASTM D 5199)																		
Thickness (mils)		288	291	288	293	282	292	289	289	288	289	289	289	282	3	NA		
Mass/Unit Area (ASTM D 5261)																		
5 in diameter Circle - Mass (grams)		18.07	17.77	17.14	17.51	18.60	18.87	17.36	18.04	18.06	18.10	17.95						
Mass/unit area (lbs./sq.ft)		0.29	0.29	0.28	0.28	0.30	0.31	0.28	0.29	0.29	0.29	0.29	0.29		0.01	NA		
Thickness (ASTM D 5199)																		
Geonet Component																		
Thickness (mils)		209	207	212	213	210	210	209	208	212	207	210	207	210	2	200 min		
Density (ASTM D 1505)																		
Geonet Component																		
Density (g/cm3)		0.951	0.951	0.951								0.951	0.000	0.94 min				
Carbon Black Content (ASTM D 4218)																		
Geonet Component																		
% Carbon Black		2.53	2.49								2.51	0.03	2 min					
Tensile Properties (ASTM D 7179) - 4" width																		
Geonet Component																		
MD Max. Strength (ppi)		67	53	58	65	63						61	6	45 min				
MD Elong. @ Max. Strength (%)		21	21	25	17	19						21	3					
MD Machine Direction		TD Transverse Direction			NA Not Available													

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.



GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810001

Geotextile Component - Side A

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	116	112	121	113	109	119	107	110	102	110	112 102	6 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.56	3.65	5.26	4.14	3.55	4.00	3.70	3.54	3.90	3.62	3.89	0.52	
Mass/Unit Area (oz/sq.yd)	8.28	8.49	12.23	9.63	8.26	9.30	8.61	8.23	9.07	8.42	9.05	1.22	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	256	186	297	235	225	248	182	311	214	245	240	42	225 min
TD - Tensile Strength (lbs)	250	271	302	318	273	283	301	285	314	278	288	21	225 min
MD - Elong. @ Max. Load (%)	81	89	73	81	95	77	84	81	83	83	83	6	
TD - Elong. @ Max. Load (%)	80	88	104	93	85	89	91	101	93	87	91	7	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	130	134	157	165	153	119	129	157	136	136	144	13	NA
	154	146	158	142	147								
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	90	99	107	95	110	107	96	126	91	106	103	11	90 min
TD - Tear Strength (lbs)	139	121	118	130	132	130	143	164	152	142	137	14	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	30												
Burst Strength (psi)	450	470	610	500	440	520	390	390	370	470	461	72	NA
												Tare Not Subtracted	
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.090	0.075	0.075	0.075						0.078	0.007	
Sieve No.	200	170	200	200	200						170		80 min
MD Machine Direction	TD Transverse Direction			NA Not Available									

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TRC Client: Waste Management, Inc.
Project: Two Pines Cell 3

TRI Log #: E2324-69-04

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810001

Geotextile Component - Side B

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)	1	2	3	4	5	6	7	8	9	10			
Thickness (mils)	117	108	113	106	112	115	107	113	96	107	109 96	6 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.86	3.58	4.28	3.38	3.74	3.97	3.55	3.96	3.30	3.05	3.67	0.37	
Mass/Unit Area (oz/sq.yd)	8.98	8.33	9.96	7.86	8.70	9.23	8.26	9.21	7.68	7.09	8.53	0.85	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	250	200	275	201	220	232	211	346	215	258	241	45	225 min
TD - Tensile Strength (lbs)	284	258	249	273	316	314	276	272	296	269	281	22	225 min
MD - Elong. @ Max. Load (%)	77	79	68	78	81	74	79	70	79	84	77	5	
TD - Elong. @ Max. Load (%)	84	75	93	83	87	89	80	91	83	85	85	5	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	169	153	155	111	144	174	139	132	159	125	143	19	NA
	144	116	126	155	149								
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	102	101	102	101	112	83	93	105	94	113	101	9	90 min
TD - Tear Strength (lbs)	128	110	147	156	127	124	131	135	166	132	136	16	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	35												
Burst Strength (psi)	460	410	480	420	430	450	430	470	360	410	432	35	NA
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.106	0.075	0.075						0.081	0.014	
Sieve No.	200	200	140	200	200						170		80 min
MD Machine Direction	TD Transverse Direction										NA Not Available		

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810001

Geotextile Component - Side B

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	22												
Correction Factor:	0.953												
Test Speciemn No. >:	1					2							
Thickness (mils)	115	115	115	115	115	100	100	100	100	100			
Time (s)	20.7	20.6	20.6	21.0	20.6	16.9	16.9	16.9	16.9	16.8			
Specimen Permittivity (s-1)	1.37	1.38	1.38	1.35	1.38	1.68	1.68	1.68	1.68	1.69			
Specimen Permittivity @20°C (sec-1)	1.31	1.31	1.31	1.29	1.31	1.60	1.60	1.60	1.60	1.61			
Specimen Flow rate (GPM/ft2)	97.7	98.2	98.2	96.3	98.2	120	120	120	120	120			
Specimen Permeability (cm/s)	0.38	0.38	0.38	0.38	0.38	0.41	0.41	0.41	0.41	0.41			
Test Speciemn No. >:	3					4							
Thickness (mils)	109	109	109	109	109	98	98	98	98	98			
Time (s)	21.8	21.9	22.2	21.9	22.2	17.8	17.8	17.7	17.8	17.7			
Permittivity (s-1)	1.30	1.30	1.28	1.30	1.28	1.59	1.59	1.60	1.59	1.60			
Specimen Permittivity @20°C (sec-1)	1.24	1.23	1.22	1.23	1.22	1.52	1.52	1.53	1.52	1.53			
Specimen Flow rate (GPM/ft2)	92.8	92.3	91.1	92.3	91.1	114	114	114	114	114			
Specimen Permeability (cm/s)	0.34	0.34	0.34	0.34	0.34	0.38	0.38	0.38	0.38	0.38			
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.41		100 min
											106		
											0.38		

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810030
TRI Log #: E2324-69-04

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	PROJ. SPEC.		
											1	2	3	4	5	6	7	8	9	10						
Hydraulic Transmissivity (ASTM D 4716)																										
Direction Tested: Machine Direction																										
Normal Load (psf):											10,000															
Hydraulic Gradient:											1.0															
Test Length (in)											12															
Test Width (in)											12															
Plate / Sample / Plate																										
Seat Time (hours)																										
											Specimen															
											1															
											2															
Volume (cc)											2215	2200	2180	2153	2218	2183										
Time (s)											3.17	3.14	3.14	3.65	3.74	3.69										
Flow Rate (GPM/ft width)											11.08	11.11	11.01	9.35	9.40	9.38						10.22	0.92			
Transmissivity (m^2/s)											2.29E-03	2.30E-03	2.28E-03	1.94E-03	1.95E-03	1.94E-03						2.12E-03	1.91E-04	1.0E-4 min		
Test Temp (C)											20.0					20.0										
Temp. Corr. Factor											1.000					1.000										
Peel Strength (ASTM D 413, mod.)																										
A - MD Average Peel Strength (ppi)											4.2	5.3	4.5	4.5	5.1						4.7	0.5	1.0 min			
A - MD Average Peel Strength (g/in)											1907	2406	2043	2043	2315						2143	209				
B - MD Average Peel Strength (ppi)											6.1	3.4	2.5	2.7	3.1						3.6	1.5	1.0 min			
B - MD Average Peel Strength (g/in)											2769	1544	1135	1226	1407						1616	664				
Note: A and B represent a randomly assigned top and bottom of the sample																										
Thickness (ASTM D 5199)																										
Thickness (mils)											300	291	293	288	278	292	301	296	286	295	292	7	NA			
																					278	<< min				
Mass/Unit Area (ASTM D 5261)																										
5 in diameter Circle - Mass (grams)											17.71	17.68	18.56	18.77	18.32	16.18	16.62	18.98	18.32	17.45	17.86					
Mass/unit area (lbs./sq.ft)											0.29	0.29	0.30	0.30	0.30	0.26	0.27	0.31	0.30	0.28	0.29	0.01	NA			
Thickness (ASTM D 5199) Geonet Component																										
Thickness (mils)											219	224	225	221	220	212	217	220	232	228	222	6	200 min			
																					212	<< min				
Density (ASTM D 1505) Geonet Component																										
Density (g/cm3)											0.953	0.953	0.953									0.953	0.000	0.94 min		
Carbon Black Content (ASTM D 4218) Geonet Component																										
% Carbon Black											2.55	2.56									2.56	0.01	2 min			
Tensile Properties (ASTM D 7179) - 4" width Geonet Component																										
MD Max. Strength (ppi)											81	56	66	67	59							66	10	45 min		
MD Elong. @ Max. Strength (%)											18	21	19	20	21							20	1			
MD Machine Direction											TD Transverse Direction										NA Not Available					

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810030

TRI Log #: E2324-69-04

Geotextile Component - Side A

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	101	111	135	104	111	98	107	121	107	107	110 98	11 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.29	3.68	4.73	3.38	3.60	3.25	3.55	4.53	3.83	3.87	3.77	0.50	
Mass/Unit Area (oz/sq.yd)	7.65	8.56	11.00	7.86	8.37	7.56	8.26	10.54	8.91	9.00	8.77	1.16	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	243	270	288	245	233	262	240	285	253	218	254	23	225 min
TD - Tensile Strength (lbs)	251	273	292	232	282	292	256	274	258	280	269	19	225 min
MD - Elong. @ Max. Load (%)	77	85	74	78	83	83	82	71	79	83	80	5	
TD - Elong. @ Max. Load (%)	76	79	105	78	85	88	80	97	84	85	86	9	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	166	157	174	146	127	146	136	170	146	107	147	18	NA
	135	132	157	143	157								
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	92	99	124	87	89	97	92	139	92	101	101	17	90 min
TD - Tear Strength (lbs)	116	126	142	130	154	122	118	160	118	108	129	17	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	30												
Burst Strength (psi)	370	450	540	360	470	370	390	460	400	420	423	57	NA
												Tare Not Subtracted	
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.075	0.075	0.075						0.075	0.000	
Sieve No.	200	200	200	200	200						200		80 min
MD Machine Direction TD Transverse Direction NA Not Available													

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810030

Geotextile Component - Side A

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.	
	1	2	3	4	5	6	7	8	9	10				
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)														
Water Temp. (C):	20													
Correction Factor:	1.000													
Test Speciemn No. >:	1					2								
Thickness (mils)	87	87	87	87	87	82	82	82	82	82				
Time (s)	20.3	20.3	20.3	20.3	20.3	20.2	20.2	20.2	20.2	20.6				
Specimen Permittivity (s-1)	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.38				
Specimen Permittivity @20°C (sec-1)	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.38				
Specimen Flow rate (GPM/ft2)	105	105	105	105	105	105	105	105	105	103				
Specimen Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.29	0.29	0.29	0.29	0.29				
Test Speciemn No. >:	3					4								
Thickness (mils)	86	86	86	86	86	82	82	82	82	82				
Time (s)	18.7	18.7	18.7	18.7	18.7	19.9	20.0	20.3	20.0	20.0				
Permittivity (s-1)	1.52	1.52	1.52	1.52	1.52	1.43	1.42	1.40	1.42	1.42				
Specimen Permittivity @20°C (sec-1)	1.52	1.52	1.52	1.52	1.52	1.43	1.42	1.40	1.42	1.42				
Specimen Flow rate (GPM/ft2)	113	113	113	113	113	107	106	105	106	106				
Specimen Permeability (cm/s)	0.33	0.33	0.33	0.33	0.33	0.30	0.30	0.29	0.30	0.30				
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.43 107 0.31			
														100 min

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810030

TRI Log #: E2324-69-04

Geotextile Component - Side B

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	109	114	124	108	110	105	107	128	111	110	113 105	8 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.61	3.62	4.38	3.40	3.83	3.66	3.66	4.45	3.61	3.76	3.80	0.34	
Mass/Unit Area (oz/sq.yd)	8.40	8.42	10.19	7.91	8.91	8.51	8.51	10.35	8.40	8.75	8.83	0.80	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	236	228	272	208	288	271	224	261	237	275	250	27	225 min
TD - Tensile Strength (lbs)	294	288	263	317	301	264	286	273	296	306	289	18	225 min
MD - Elong. @ Max. Load (%)	77	79	71	75	76	83	74	71	81	75	76	4	
TD - Elong. @ Max. Load (%)	83	79	107	88	90	80	88	107	87	89	90	10	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	138 144	131 143	152 136	137 127	136 132	156	143	175	146	150	143	12	NA
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	97	72	100	96	99	113	88	97	93	105	96	11	90 min
TD - Tear Strength (lbs)	119	117	129	135	99	136	107	106	118	104	117	13	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 30													
Burst Strength (psi)	440	430	530	430	440	410	410	590	420	450	455	59	NA
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.090	0.075	0.075						0.078	0.007	
Sieve No.	200	200	170	200	200						170		80 min
MD Machine Direction	TD Transverse Direction										NA Not Available		

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810030

Geotextile Component - Side B

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	22												
Correction Factor:	0.953												
Test Speciemn No. >:	1					2							
Thickness (mils)	110	110	110	110	110	107	107	107	107	107			
Time (s)	17.7	17.7	17.7	18.1	17.8	18.7	19.0	18.7	18.7	19.0			
Specimen Permittivity (s-1)	1.60	1.60	1.60	1.57	1.59	1.52	1.49	1.52	1.52	1.49			
Specimen Permittivity @20°C (sec-1)	1.53	1.53	1.53	1.49	1.52	1.45	1.42	1.45	1.45	1.42			
Specimen Flow rate (GPM/ft2)	114	114	114	112	114	108	106	108	108	106			
Specimen Permeability (cm/s)	0.43	0.43	0.43	0.42	0.42	0.39	0.39	0.39	0.39	0.39			
Test Speciemn No. >:	3					4							
Thickness (mils)	110	110	110	110	110	107	107	107	107	107			
Time (s)	23.1	22.7	23.1	23.1	23.1	19.3	19.6	19.4	19.6	19.7			
Permittivity (s-1)	1.23	1.25	1.23	1.23	1.23	1.47	1.45	1.46	1.45	1.44			
Specimen Permittivity @20°C (sec-1)	1.17	1.19	1.17	1.17	1.17	1.40	1.38	1.39	1.38	1.37			
Specimen Flow rate (GPM/ft2)	87.5	89.1	87.5	87.5	87.5	105	103	104	103	103			
Specimen Permeability (cm/s)	0.33	0.33	0.33	0.33	0.33	0.38	0.37	0.38	0.37	0.37			
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.38 103 0.38		

100 min

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810060
TRI Log #: E2324-69-04

PARAMETER											TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.	
											1	2	3	4	5	6	7	8	9	10				
Hydraulic Transmissivity (ASTM D 4716)																								
Direction Tested: Machine Direction																								
Normal Load (psf):		10,000																						
Hydraulic Gradient:		1.0																						
Test Length (in)		12																						
Test Width (in)		12																						
Plate / Sample / Plate																								
Seat Time (hours)																								
		Specimen		1								2												
0.25	Volume (cc)	2043		2051		2093		2065		2090		2075												
	Time (s)	3.17		3.17		3.22		3.13		3.16		3.16												
	Flow Rate (GPM/ft width)	10.22		10.26		10.30		10.46		10.48		10.41												
	Transmissivity (m²/2/s)	2.11E-03		2.12E-03		2.13E-03		2.16E-03		2.17E-03		2.15E-03												
	Test Temp (C)			20.0				20.0																
	Temp. Corr. Factor			1.000				1.000																
																						10.35	0.11	
																						2.14E-03	2.30E-05	1.0E-4 min
Peel Strength (ASTM D 413, mod.)																								
A - MD Average Peel Strength (ppi)		2.7	4.2	3.8	5.1	3.2						3.8		0.9	1.0 min									
A - MD Average Peel Strength (g/in)		1226	1907	1725	2315	1453						1725		420										
B - MD Average Peel Strength (ppi)		3.9	4.6	4.8	3.0	3.9						4.0		0.7	1.0 min									
B - MD Average Peel Strength (g/in)		1771	2088	2179	1362	1771						1834		322										
Note: A and B represent a randomly assigned top and bottom of the sample																								
Thickness (ASTM D 5199)																								
Thickness (mils)		286	297	290	293	291	288	290	295	294	294	292		3	NA									
												286		<< min										
Mass/Unit Area (ASTM D 5261)																								
5 in diameter Circle - Mass (grams)		18.20	18.18	18.51	18.03	18.20	18.20	19.31	19.75	17.57	18.53	18.45												
Mass/unit area (lbs./sq.ft)		0.29	0.29	0.30	0.29	0.29	0.29	0.31	0.32	0.28	0.30	0.30		0.01	NA									
Thickness (ASTM D 5199) Geonet Component																								
Thickness (mils)		220	222	225	220	224	221	212	232	232	213	222		7	200 min									
												212		<< min										
Density (ASTM D 1505) Geonet Component																								
Density (g/cm3)		0.954	0.954	0.954											0.954		0.000	0.94 min						
Carbon Black Content (ASTM D 4218) Geonet Component																								
% Carbon Black		2.45	2.47											2.46		0.01	2 min							
Tensile Properties (ASTM D 7179) - 4" width Geonet Component																								
MD Max. Strength (ppi)		62	74	70	60	71						67		6	45 min									
MD Elong. @ Max. Strength (%)		20	19	19	19	23						20		2										
MD Machine Direction		TD Transverse Direction			NA Not Available																			

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810060

TRI Log #: E2324-69-04

Geotextile Component - Side A

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	114	113	121	104	119	111	104	109	103	114	111 103	6 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.64	3.83	4.49	3.44	3.99	3.80	3.32	4.03	3.26	3.82	3.76	0.37	
Mass/Unit Area (oz/sq.yd)	8.47	8.91	10.44	8.00	9.28	8.84	7.72	9.37	7.58	8.89	8.75	0.86	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	226	232	315	225	265	240	296	323	232	306	266	40	225 min
TD - Tensile Strength (lbs)	315	262	257	264	290	291	277	286	323	271	284	22	225 min
MD - Elong. @ Max. Load (%)	77	81	71	86	78	82	88	73	83	87	81	6	
TD - Elong. @ Max. Load (%)	85	78	104	78	90	86	81	85	111	82	88	11	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	157 145	118 152	174 142	113 153	140 133	140	146	175	140	134	144	17	NA
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	102	83	98	91	88	105	79	101	99	94	94	9	90 min
TD - Tear Strength (lbs)	105	149	136	163	133	160	126	128	157	121	138	19	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	30												
Burst Strength (psi)	450	420	490	360	480	440	390	400	400	460	429	42	NA
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.075	0.075	0.090						0.078	0.007	
Sieve No.	200	200	200	200	170						170		80 min
MD Machine Direction	TD Transverse Direction										NA Not Available		

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810060

Geotextile Component - Side A

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.	
	1	2	3	4	5	6	7	8	9	10				
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)														
Water Temp. (C):	20													
Correction Factor:	1.000													
Test Speciemn No. >:	1					2								
Thickness (mils)	84	84	84	84	84	86	86	86	86	86				
Time (s)	18.4	18.4	18.4	18.1	18.4	20.3	20.3	20.3	20.3	20.3				
Specimen Permittivity (s-1)	1.54	1.54	1.54	1.57	1.54	1.40	1.40	1.40	1.40	1.40				
Specimen Permittivity @20°C (sec-1)	1.54	1.54	1.54	1.57	1.54	1.40	1.40	1.40	1.40	1.40				
Specimen Flow rate (GPM/ft2)	115	115	115	117	115	105	105	105	105	105				
Specimen Permeability (cm/s)	0.33	0.33	0.33	0.33	0.33	0.31	0.31	0.31	0.31	0.31				
Test Speciemn No. >:	3					4								
Thickness (mils)	85	85	85	85	85	84	84	84	84	84				
Time (s)	21.5	21.8	21.5	21.5	21.6	19.3	19.6	19.4	19.6	19.6				
Permittivity (s-1)	1.32	1.30	1.32	1.32	1.31	1.47	1.45	1.46	1.45	1.45				
Specimen Permittivity @20°C (sec-1)	1.32	1.30	1.32	1.32	1.31	1.47	1.45	1.46	1.45	1.45				
Specimen Flow rate (GPM/ft2)	99	97	99	99	98	110	108	109	108	108				
Specimen Permeability (cm/s)	0.28	0.28	0.28	0.28	0.28	0.31	0.31	0.31	0.31	0.31				
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.43 107 0.31			
														100 min

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810060

TRI Log #: E2324-69-04

Geotextile Component - Side B

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	116	103	127	108	112	108	108	123	110	112	113 103	7 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.62	3.45	4.84	3.67	3.60	3.59	3.55	4.65	3.66	3.59	3.82	0.49	
Mass/Unit Area (oz/sq.yd)	8.42	8.02	11.26	8.54	8.37	8.35	8.26	10.82	8.51	8.35	8.89	1.15	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	240	235	315	212	251	232	237	296	233	237	249	32	225 min
TD - Tensile Strength (lbs)	265	277	265	289	298	253	235	310	260	279	273	22	225 min
MD - Elong. @ Max. Load (%)	80	83	71	87	91	71	83	75	77	81	80	7	
TD - Elong. @ Max. Load (%)	83	81	102	85	87	83	73	109	79	87	87	11	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	156	130	146	162	143	143	136	156	140	138	145	11	NA
	152	165	146	139	125								
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	96	102	146	93	104	88	82	157	79	98	105	26	90 min
TD - Tear Strength (lbs)	120	133	146	132	114	119	128	134	130	121	128	9	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 30													
Burst Strength (psi)	430	370	570	430	420	420	430	520	450	470	451	57	NA
												Tare Not Subtracted	
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.106	0.075	0.106	0.075	0.075						0.087	0.017	
Sieve No.	140	200	140	200	200						170		80 min
MD Machine Direction	TD Transverse Direction										NA Not Available		

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810060

Geotextile Component - Side B

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	21												
Correction Factor:	0.976												
Test Speciemn No. >:	1					2							
Thickness (mils)	109	109	109	109	109	103	103	103	103	103			
Time (s)	18.8	19.1	19.1	18.8	19.1	19.4	18.8	19.0	18.7	18.7			
Specimen Permittivity (s-1)	1.51	1.49	1.49	1.51	1.49	1.46	1.51	1.49	1.52	1.52			
Specimen Permittivity @20°C (sec-1)	1.47	1.45	1.45	1.47	1.45	1.43	1.47	1.46	1.48	1.48			
Specimen Flow rate (GPM/ft2)	110	108	108	110	108	107	110	109	111	111			
Specimen Permeability (cm/s)	0.41	0.40	0.40	0.41	0.40	0.37	0.39	0.38	0.39	0.39			
Test Speciemn No. >:	3					4							
Thickness (mils)	116	116	116	116	116	106	106	106	106	106			
Time (s)	23.1	23.1	23.4	23.1	23.4	19.4	19.7	19.7	19.3	19.7			
Permittivity (s-1)	1.23	1.23	1.21	1.23	1.21	1.46	1.44	1.44	1.47	1.44			
Specimen Permittivity @20°C (sec-1)	1.20	1.20	1.18	1.20	1.18	1.43	1.41	1.41	1.43	1.41			
Specimen Flow rate (GPM/ft2)	89.7	89.7	88.5	89.7	88.5	107	105	105	107	105			
Specimen Permeability (cm/s)	0.35	0.35	0.35	0.35	0.35	0.38	0.38	0.38	0.39	0.38			
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.37 103 0.38		

100 min

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite
Sample Identification: 310810090
TRI Log #: E2324-69-04

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	PROJ. SPEC.			
											1	2	3	4	5	6	7	8	9	10							
Hydraulic Transmissivity (ASTM D 4716)																											
Direction Tested: Machine Direction																											
Normal Load (psf):		10,000																									
Hydraulic Gradient:		1.0																									
Test Length (in)		12																									
Test Width (in)		12																									
Plate / Sample / Plate																											
Seat Time (hours)		Specimen																									
		1					2																				
Volume (cc)		2283	2273	2208	2065	2021	2031																				
Time (s)		3.69	3.66	3.60	3.26	3.21	3.20																				
0.25	Flow Rate (GPM/ft width)	9.81	9.84	9.72	10.04	9.98	10.06																				
	Transmissivity (m^2/s)	2.03E-03	2.04E-03	2.01E-03	2.08E-03	2.07E-03	2.08E-03																				
	Test Temp (C)	20.0											20.0														
	Temp. Corr. Factor	1.000											1.000														
Peel Strength (ASTM D 413, mod.)																											
A - MD Average Peel Strength (ppi)		5.9	3.2	2.2	4.5	3.7																					
A - MD Average Peel Strength (g/in)		2679	1453	999	2043	1680																					
B - MD Average Peel Strength (ppi)		3.3	4.8	5.0	2.4	5.4																					
B - MD Average Peel Strength (g/in)		1498	2179	2270	1090	2452																					
Note: A and B represent a randomly assigned top and bottom of the sample																											
Thickness (ASTM D 5199)																											
Thickness (mils)		294	290	289	285	281	291	288	295	279	285																
												288															
												279															
												5															
												<< min															
												NA															
Mass/Unit Area (ASTM D 5261)																											
5 in diameter Circle - Mass (grams)		16.48	17.30	18.76	19.13	18.93	18.68	17.95	17.06	19.23	17.99																
Mass/unit area (lbs./sq.ft)		0.27	0.28	0.30	0.31	0.31	0.30	0.29	0.28	0.31	0.29																
												18.15															
												0.29															
												0.02															
												NA															
Thickness (ASTM D 5199) Geonet Component																											
Thickness (mils)		209	214	216	216	235	240	232	220	217	229																
												223															
												209															
												10															
												<< min															
												200 min															
Density (ASTM D 1505) Geonet Component																											
Density (g/cm3)		0.951	0.951	0.951																							
												0.951															
												0.000															
												0.94 min															
Carbon Black Content (ASTM D 4218) Geonet Component																											
% Carbon Black		2.40	2.43																								
												2.42															
												0.02															
												2 min															
Tensile Properties (ASTM D 7179) - 4" width Geonet Component																											
MD Max. Strength (ppi)		73	54	70	66	64																					
												65															
												7															
												45 min															
MD Elong. @ Max. Strength (%)		17	21	21	19	21																					
												20															
												2															
MD Machine Direction TD Transverse Direction NA Not Available																											

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810090

TRI Log #: E2324-69-04

Geotextile Component - Side A

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	114	111	119	100	98	98	103	116	105	106	107 98	8 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.76	3.53	4.15	3.34	3.30	3.32	3.39	4.12	3.70	3.34	3.60	0.33	
Mass/Unit Area (oz/sq.yd)	8.75	8.21	9.65	7.77	7.68	7.72	7.89	9.58	8.61	7.77	8.36	0.76	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	240	199	306	224	251	215	217	287	244	240	242	33	225 min
TD - Tensile Strength (lbs)	263	261	232	256	268	245	269	291	314	262	266	23	225 min
MD - Elong. @ Max. Load (%)	73	79	74	76	81	69	79	67	76	87	76	6	
TD - Elong. @ Max. Load (%)	85	83	97	81	89	87	79	95	89	83	87	6	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	108 144	117 134	143 145	121 146	150 134	143	156	163	127	115	136	16	NA
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	89	81	115	91	124	88	86	118	80	88	96	16	90 min
TD - Tear Strength (lbs)	110	117	104	95	114	122	123	133	118	124	116	11	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): 30													
Burst Strength (psi)	450	400	420	410	360	370	380	450	450	410	410	33	NA
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.075	0.075	0.075						0.075	0.000	
Sieve No.	200	200	200	200	200						200		80 min
MD Machine Direction	TD Transverse Direction				NA Not Available								

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810090

Geotextile Component - Side A

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	20												
Correction Factor:	1.000												
Test Speciemn No. >:	1					2							
Thickness (mils)	76	76	76	76	76	78	78	78	78	78			
Time (s)	18.8	18.7	18.8	18.7	18.4	20.3	20.3	20.3	20.3	20.0			
Specimen Permittivity (s-1)	1.51	1.52	1.51	1.52	1.54	1.40	1.40	1.40	1.40	1.42			
Specimen Permittivity @20°C (sec-1)	1.51	1.52	1.51	1.52	1.54	1.40	1.40	1.40	1.40	1.42			
Specimen Flow rate (GPM/ft2)	113	113	113	113	115	105	105	105	105	106			
Specimen Permeability (cm/s)	0.29	0.29	0.29	0.29	0.30	0.28	0.28	0.28	0.28	0.28			
Test Speciemn No. >:	3					4							
Thickness (mils)	86	86	86	86	86	77	77	77	77	77			
Time (s)	21.6	21.2	21.3	21.2	21.2	18.4	18.4	18.1	18.1	18.0			
Permittivity (s-1)	1.31	1.34	1.33	1.34	1.34	1.54	1.54	1.57	1.57	1.58			
Specimen Permittivity @20°C (sec-1)	1.31	1.34	1.33	1.34	1.34	1.54	1.54	1.57	1.57	1.58			
Specimen Flow rate (GPM/ft2)	98	100	100	100	100	115	115	117	117	118			
Specimen Permeability (cm/s)	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.31	0.31	0.31			
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.45 109 0.29		100 min

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810090

TRI Log #: E2324-69-04

Geotextile Component - Side B

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	118	110	136	119	107	118	114	143	114	110	119 107	12 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.84	3.82	4.76	3.69	3.51	4.01	3.92	4.69	3.80	3.64	3.97	0.42	
Mass/Unit Area (oz/sq.yd)	8.93	8.89	11.07	8.58	8.16	9.33	9.12	10.91	8.84	8.47	9.23	0.98	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	278	258	307	230	242	266	236	306	252	280	266	27	225 min
TD - Tensile Strength (lbs)	331	281	313	319	316	302	264	253	290	304	297	25	225 min
MD - Elong. @ Max. Load (%)	82	86	73	78	81	78	84	78	82	92	81	5	
TD - Elong. @ Max. Load (%)	91	82	105	93	89	85	84	90	91	90	90	6	
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	155 180	170 161	152 194	124 127	165 147	130	153	163	137	172	155	20	NA
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	107	116	110	101	104	92	124	101	109	94	106	10	90 min
TD - Tear Strength (lbs)	116	148	153	140	125	144	140	146	135	109	136	14	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	35												
Burst Strength (psi)	450	450	480	460	400	470	490	540	430	430	460	39	NA
												Tare Not Subtracted	
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.075	0.075	0.075	0.075	0.075						0.075	0.000	
Sieve No.	200	200	200	200	200						200		80 min
MD Machine Direction TD Transverse Direction NA Not Available													

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GEOCOMPOSITE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS TN200-2-8 Double Sided Geocomposite

Sample Identification: 310810090

Geotextile Component - Side B

TRI Log #: E2324-69-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	20												
Correction Factor:	1.000												
Test Speciemn No. >:	1					2							
Thickness (mils)	81	81	81	81	81	89	89	89	89	89			
Time (s)	19.0	19.0	19.0	19.0	19.0	22.8	22.8	22.8	22.5	22.8			
Specimen Permittivity (s-1)	1.49	1.49	1.49	1.49	1.49	1.24	1.24	1.24	1.26	1.24			
Specimen Permittivity @20°C (sec-1)	1.49	1.49	1.49	1.49	1.49	1.24	1.24	1.24	1.26	1.24			
Specimen Flow rate (GPM/ft2)	112	112	112	112	112	93	93	93	94	93			
Specimen Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.28	0.28	0.28	0.29	0.28			
Test Speciemn No. >:	3					4							
Thickness (mils)	89	89	89	89	89	71	71	71	71	71			
Time (s)	21.2	21.2	20.9	21.2	21.2	17.8	18.2	17.8	17.8	17.8			
Permittivity (s-1)	1.34	1.34	1.36	1.34	1.34	1.59	1.56	1.59	1.59	1.59			
Specimen Permittivity @20°C (sec-1)	1.34	1.34	1.36	1.34	1.34	1.59	1.56	1.59	1.59	1.59			
Specimen Flow rate (GPM/ft2)	100.1	100.1	101.5	100.1	100.1	119	117	119	119	119			
Specimen Permeability (cm/s)	0.30	0.30	0.31	0.30	0.30	0.29	0.28	0.29	0.29	0.29			
TEMPERATURE CORRECTED VALUES						Permittivity (s-1) Flow rate (GPM/ft2) Permeability (cm/s)					1.42		
											106		
											0.29		
100 min													

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

APPENDIX V
LEACHATE COLLECTION SYSTEM MATERIAL
TEST RESULTS



SKAPS Industries (Nonwoven Division)
335, Athena Drive
Athens, GA 30601 (U.S.A.)
Phone (706) 354-3700 Fax (706) 354-3737
E-mail: info@skaps.com

Sales Office:
Engineered Synthetic Product Inc.
Phone: (770)564-1857
Fax: (770)564-1818

March 10, 2009
Waste Management

Ref : Two Pine Landfill

Dear Sir/Madam:

This is to certify that SKAPS GE180 is a high quality needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, randomly networked to form a high strength dimensionally stable fabric. SKAPS GE180 resists ultraviolet deterioration, rotting, biological degradation. The fabric is inert to commonly encountered soil chemicals. Polypropylene is stable within a pH range of 2 to 13. SKAPS GE180 conforms to the property values listed below:

PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/sy (g/m ²)	8.00 (271)
Thickness*	ASTM D 5199	mils (mm)	100 (2.54)
Grab Tensile	ASTM D 4632	lbs (kN)	225 (1.00)
Grab Elongation	ASTM D 4632	%	50
Trapezoidal Tear	ASTM D 4533	lbs (kN)	90 (0.40)
Puncture Resistance	ASTM D 4833	lbs (kN)	130 (0.58)
Mullen Burst Strength	ASTM D 3786	psi (kPa)	425 (2930)
Permittivity*	ASTM D 4491	sec ⁻¹	1.26
Permeability*	ASTM D 4491	cm/sec	0.30
Water Flow*	ASTM D 4491	gpm/ft ² (l/min/m ²)	100 (4074)
AOS*	ASTM D 4751	US Sieve (mm)	80 (0.18)
UV Resistance	ASTM D 4355	%/hrs	70/500

Notes:

* At the time of manufacturing. Handling may change these properties.

ANURAG SHAH
QUALITY CONTROL MANAGER

Product : GE180-15

ROLL #	WEIGHT	THICKNESS	MD TENSILE	MD ELONG	XMD TENSILE	XMD ELONG	MD TRAP	XMD TRAP	PUNCTURE	MULLEN	AOS	WATER FLOW	PERMEABILITY	PERMITTIVITY
ASTM METHOD	D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D4833	D3786	D4751	D4491	D4491	D4491
UNITS	oz/sq yd	(mils)	lbs.	%	lbs	%	lbs.	lbs	lbs.	psi	US Sieve	gpm/ft ²	cm/sec	sec ⁻¹
TARGET	8.00	100	225	50	225	50	90	90	130	425	80	100	0.30	1.26
11465.01	8.14	123	229	67	235	79	98	104	133	429	80	104	0.43	1.39
11465.02	8.14	123	229	67	235	79	98	104	133	429	80	104	0.43	1.39

*All Values are MARV.



March 17, 2009

Mail To:

Mr. David Conrad
Waste Management, Inc.

email: dconrad@wm.com

Bill To:

<= Same

Dear Mr. Conrad:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Two Pines Cell 3

TRI Job Reference Number:

E2324-81-01

Material(s) Tested:

1 SKAPS 8 oz Nonwoven Geotextile(s)

Test(s) Requested:

Thickness (ASTM D 5199)
Mass/Unit Area (ASTM D 5261)
Grab Tensile (ASTM D 4632)
Puncture Strength (ASTM D 4833)
Trapezoidal Tear (ASTM D 4533)
Mullen Burst (ASTM D 3786)
Apparent Opening Size (ASTM D 4751)
Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager



GEOTEXTILE TEST RESULTS

TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS 8 oz Nonwoven Geotextile
Sample Identification: 11465.01
TRI Log #: E2324-81-01

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mils)	117	114	111	99	103	115	112	108	113	117	111 99	6 << min	NA
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	3.94	3.81	4.48	3.80	4.03	3.93	3.17	3.90	3.74	3.38	3.82	0.36	
Mass/Unit Area (oz/sq.yd)	9.16	8.86	10.42	8.84	9.37	9.14	7.37	9.07	8.70	7.86	8.88	0.83	8 min
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	205	200	237	217	329	209	216	293	260	244	241	42	225 min
TD - Tensile Strength (lbs)	295	259	252	301	298	242	258	268	282	299	275	22	225 min
MD - Elong. @ Max. Load (%)	73	68	73	74	76	73	74	69	86	75	74	5	50 min
TD - Elong. @ Max. Load (%)	90	89	81	83	99	87	77	94	83	92	88	7	50 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	157	114	141	114	123	159	125	153	119	144	138	18	130 min
	166	131	160	140	124								
Trapezoidal Tear (ASTM D 4533)													
MD - Tear Strength (lbs)	95	87	134	106	89	96	104	104	87	91	99	14	90 min
TD - Tear Strength (lbs)	126	121	97	99	121	96	112	109	106	114	110	11	90 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi):	35												
Burst Strength (psi)	475	450	500	475	450	450	400	425	425	375	443	37	NA
											Tare Not Subtracted		
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.125	0.106	0.106	0.125						0.110	0.015	
Sieve No.	170	120	140	140	120						120		80 min
MD Machine Direction	TD Transverse Direction			NA Not Available									

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



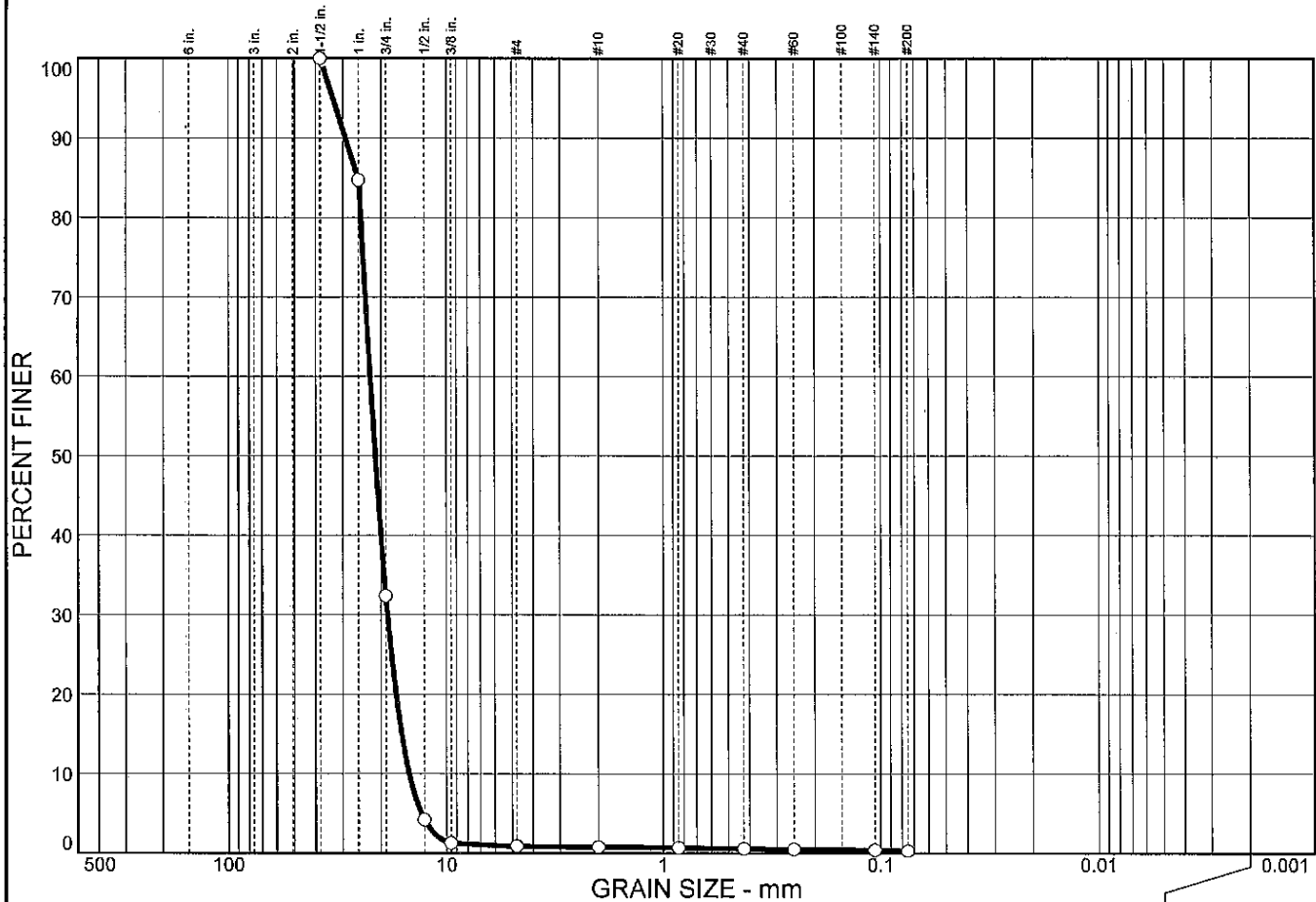
GEOTEXTILE TEST RESULTS
TRI Client: Waste Management, Inc.
Project: Two Pines Cell 3

Material: SKAPS 8 oz Nonwoven Geotextile
Sample Identification: 11465.01
TRI Log #: E2324-81-01

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Falling Head Permittivity (ASTM D 4491, 9-in Upper Standpipe; 2 in opening)													
Water Temp. (C):	20												
Correction Factor:	1.000												
Test Speciemn No. >:	1					2							
Thickness (mils)	117	117	117	117	117	99	99	99	99	99			
Time (s)	21.5	21.5	21.5	21.3	21.6	16.8	16.8	17.2	17.2	17.2			
Specimen Permittivity (s-1)	1.32	1.32	1.32	1.33	1.31	1.69	1.69	1.65	1.65	1.65			
Specimen Permittivity @20°C (sec-1)	1.32	1.32	1.32	1.33	1.31	1.69	1.69	1.65	1.65	1.65			
Specimen Flow rate (GPM/ft2)	98.7	98.7	98.7	99.6	98.3	126	126	123	123	123			
Specimen Permeability (cm/s)	0.39	0.39	0.39	0.40	0.39	0.42	0.42	0.41	0.41	0.41			
Test Speciemn No. >:	3					4							
Thickness (mils)	114	114	114	114	114	111	111	111	111	111			
Time (s)	22.5	22.5	22.5	22.5	22.5	19.7	19.3	19.7	19.7	19.7			
Permittivity (s-1)	1.26	1.26	1.26	1.26	1.26	1.44	1.47	1.44	1.44	1.44			
Specimen Permittivity @20°C (sec-1)	1.26	1.26	1.26	1.26	1.26	1.44	1.47	1.44	1.44	1.44			
Specimen Flow rate (GPM/ft2)	94.3	94.3	94.3	94.3	94.3	108	110	108	108	108			
Specimen Permeability (cm/s)	0.37	0.37	0.37	0.37	0.37	0.41	0.41	0.41	0.41	0.41			
						TEMPERATURE CORRECTED VALUES		Permittivity (s-1)			1.42	1.26 min	
								Flow rate (GPM/ft2)			106		
								Permeability (cm/s)			0.40		

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	99.1	0.6	0.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	84.7		
.75 in.	32.4		
.5 in.	4.2		
.375 in.	1.3		
#4	0.9		
#10	0.8		
#20	0.7		
#40	0.6		
#60	0.5		
#140	0.4		
#200	0.3		

* (no specification provided)

Material Description

Poorly graded gravel

Atterberg Limits

PL=

LL=

PI=

Coefficients

D₈₅= 25.6

D₆₀= 22.4

D₅₀= 21.3

D₃₀= 18.7

D₁₅= 16.1

D₁₀= 14.9

C_u= 1.50

C_c= 1.05

Classification

USCS= GP

AASHTO=

Remarks

Sample No.: PG-1

Location:

Source of Sample: 5474

Date: 7-29-09

Elev./Depth:

Terracon

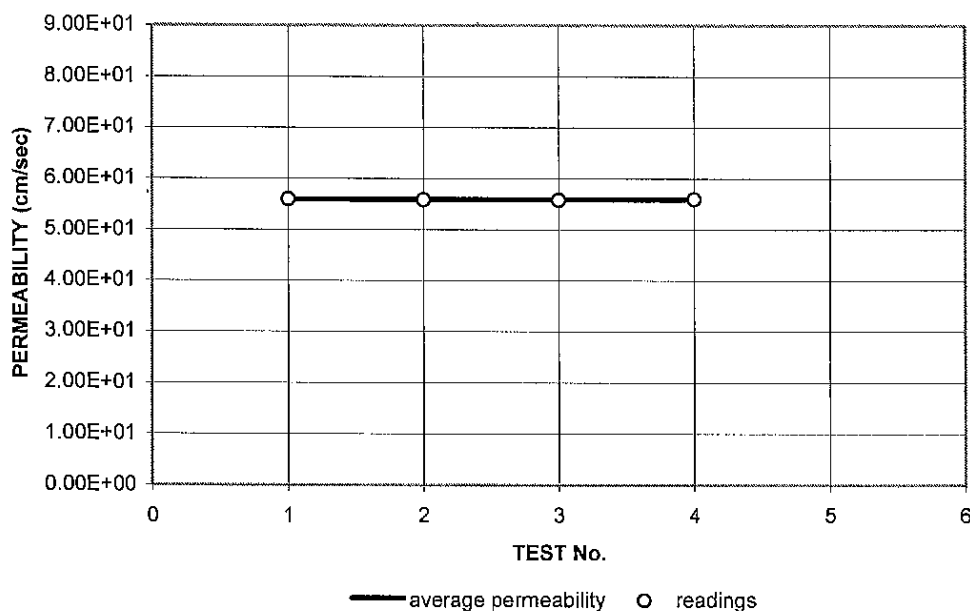
Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 5474

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head (cm)	Flow Volume (cm ³)	Elapsed Time (s)	Calculated Permeability (cm/s)
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)				
1	41.8	41.9	1000		0.1	1000	14.94	5.59E+01
2	41.8	41.9	1000		0.1	1000	14.97	5.58E+01
3	41.8	41.9	1000		0.1	1000	15	5.57E+01
4	41.8	41.9	1000		0.1	1000	14.95	5.59E+01
Average								5.59E+01

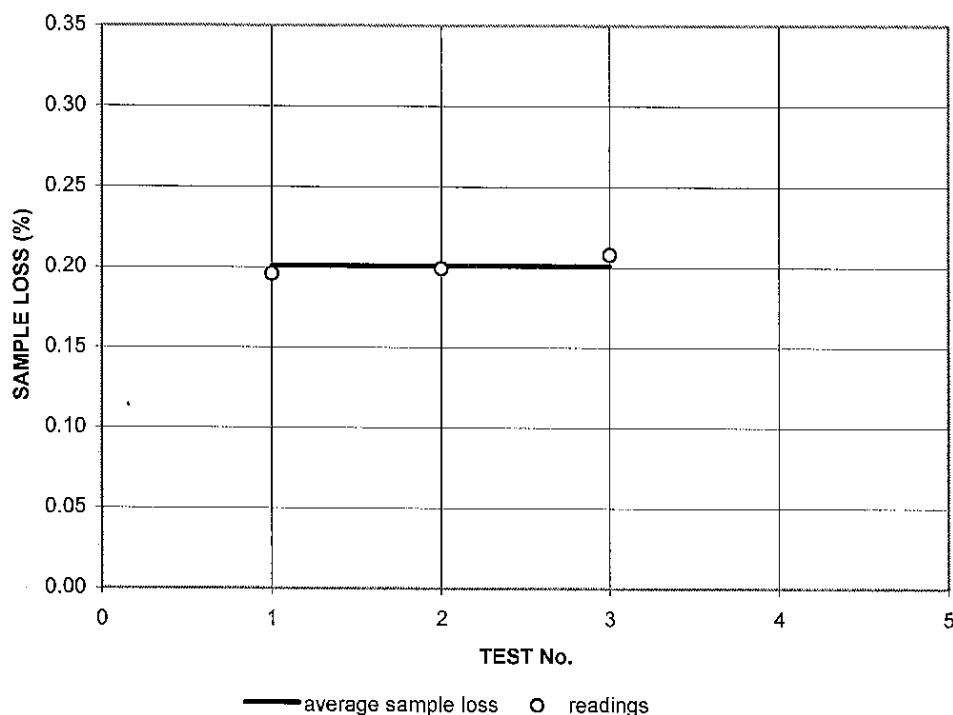
Specimen Conditions

Diameter D (in)	6.0	Weight of Specimen (gms)	5638.0
Length of Specimen (in)	8.0	Density of Specimen (pcf)	95.0
Length of Flow (in)	6.0	Approximate Porosity(%)	43.6

Material Description	Remarks
Carbonate Content (%)	
USCS	
Water Content (%)	

Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE	Review by	TGG
Client	WM	W.O.#	35097116	CONSTANT HEAD PERMEABILITY TEST Terracon			
Sample Number	S-5474						
Sample Location	PG-1						
Date	28-Jul-09	Lab No.	5474				

INSOLUBLE CARBONATE CONTENT TEST



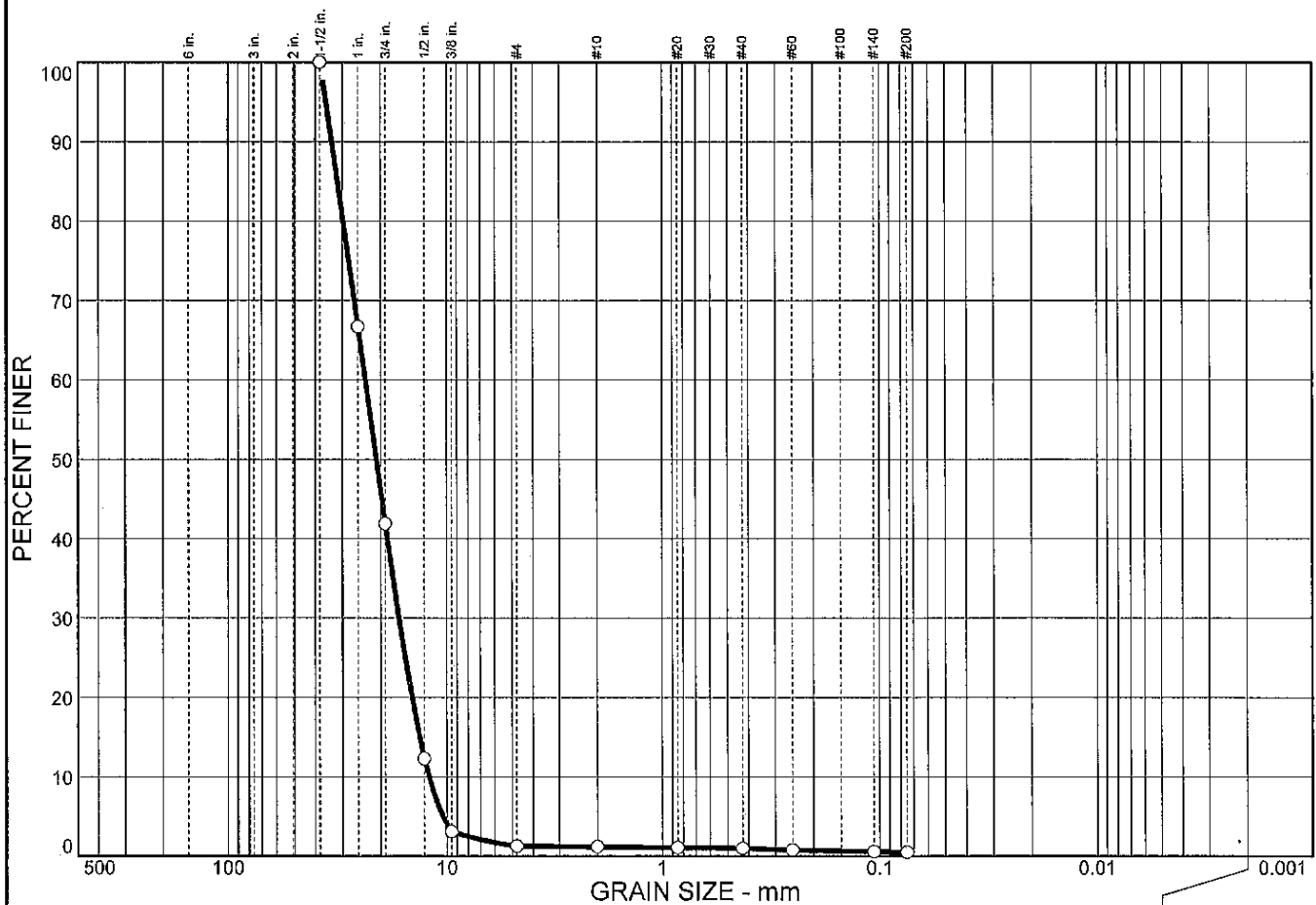
Test Specification: ASTM D 3042

Trial No.	Sample+ Tare Weight (g)	Tare Weight (g)	Sample Weight (g)	Sample+ Tare Weight (g)	Tare Weight (g)	Sample Weight (g)	Sample Loss (g)	Sample Loss (%)
1	1122.3		1122.3	1120.1		1120.1	2.2	0.20
2	1203.5		1203.5	1201.1		1201.1	2.4	0.20
3	1009.6		1009.6	1007.5		1007.5	2.1	0.21
Total	3335.4		3335.4	3328.7		3328.7	6.7	0.20

Material Description	Remarks
Permeability (cm/s) 5.59E+01 USCS	Solution: J & L Method

Project Name	WM TWO PINE-CELL 3 CQA	Tested by	Review. by	TGG
Client	WM	W.O.#	35097116	
Sample Number	S-5474	INSOLUBLE CARBONATE CONTENT TEST 		
Sample Location	PG-1			
Date	29-Jul-09			
Lab No.	5474			

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	98.7	0.8	0.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	66.7		
.75 in.	41.9		
.5 in.	12.3		
.375 in.	3.1		
#4	1.3		
#10	1.2		
#20	1.1		
#40	1.0		
#60	0.8		
#140	0.6		
#200	0.5		

* (no specification provided)

Material Description

Poorly graded gravel

Source: Cousins Material Inc.

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 31.7 D₆₀= 23.5 D₅₀= 20.9
D₃₀= 16.5 D₁₅= 13.3 D₁₀= 12.1
C_u= 1.94 C_c= 0.96

Classification

USCS= GP AASHTO=

Remarks

Sample No.: CG-1
Location:

Source of Sample: 6143

Date: 8-27-09
Elev./Depth:

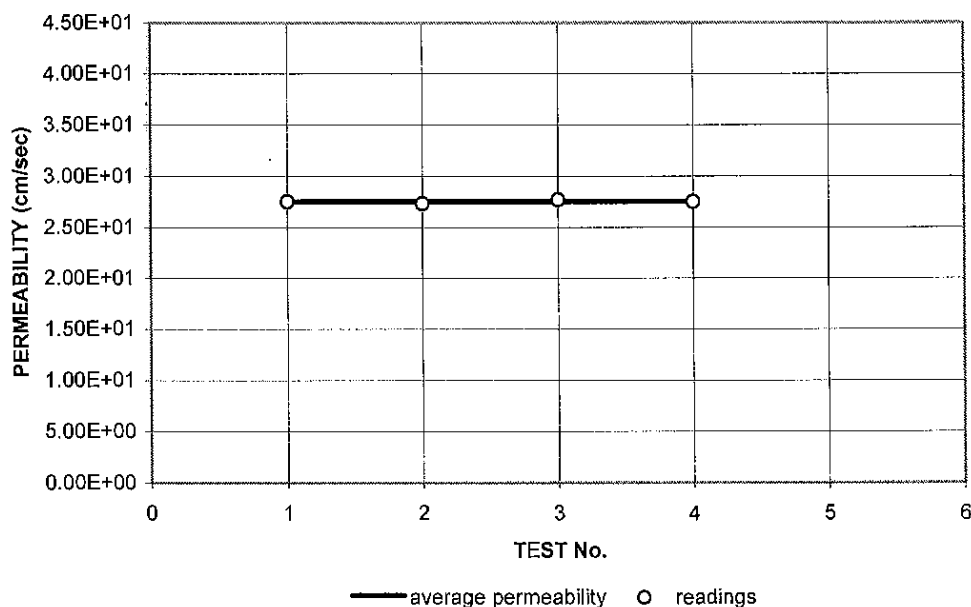
Terracon

Client: WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 6143

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head (cm)	Flow Volume (cm ³)	Elapsed Time (s)	Calculated Permeability (cm/s)
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)				
1	41.1	41.3	1000		0.2	1000	15.2	2.75E+01
2	41.1	41.3	1000		0.2	1000	15.3	2.73E+01
3	41.1	41.3	1000		0.2	1000	15.1	2.77E+01
4	41.1	41.3	1000		0.2	1000	15.2	2.75E+01
Average								2.75E+01

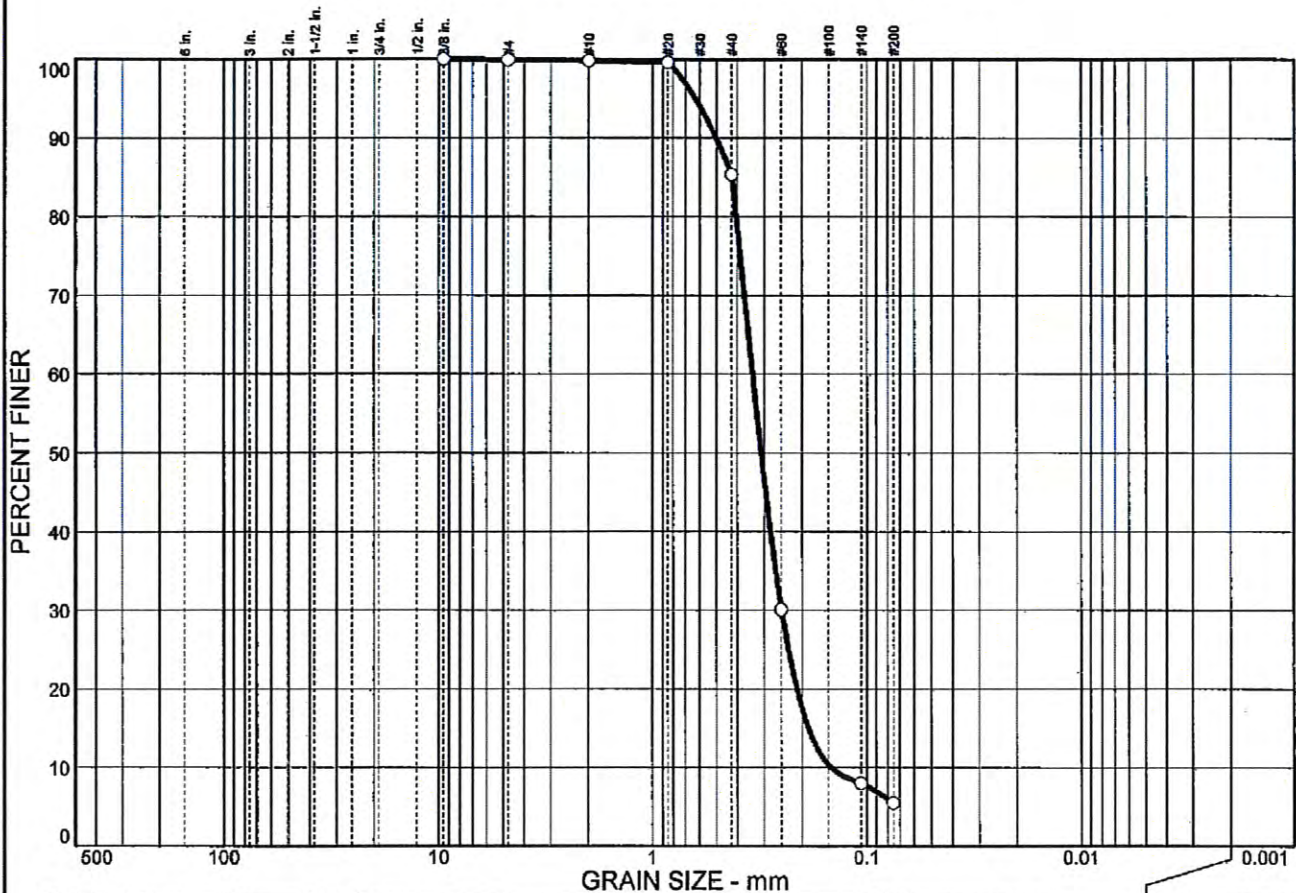
Specimen Conditions

Diameter D (in)	6.0	Weight of Specimen (gms)	5985.0
Length of Specimen (in)	8.0	Density of Specimen (pcf)	100.8
Length of Flow (in)	6.0	Approximate Porosity(%)	40.2

Material Description	Remarks
Carbonate Content (%)	Source: Cousin's Materials Inc.
USCS	
Water Content (%)	

Project Name	WM TWO PINE-CELL 3 CQA			Tested by	FCE	Review by	TGG
Client	WM	W.O.#	35097116	CONSTANT HEAD PERMEABILITY TEST 			
Sample Number	S-6143						
Sample Location	CG-1						
Date	26-Aug-09	Lab No.	6143				

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	94.4	5.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.9		
#10	99.8		
#20	99.6		
#40	85.3		
#60	30.1		
#140	8.0		
#200	5.5		

* (no specification provided)

Material Description

SAND
(Poorly graded sand with silt)

PL= Atterberg Limits LL= PI=

Coefficients
D₈₅= 0.424 D₆₀= 0.341 D₅₀= 0.311
D₃₀= 0.250 D₁₅= 0.187 D₁₀= 0.146
C_u= 2.34 C_c= 1.25

Classification
USCS= SP-SM AASHTO=

Remarks

Sample No.: PS-1
Location:

Source of Sample: 5473

Date: 7-29-09
Elev./Depth:

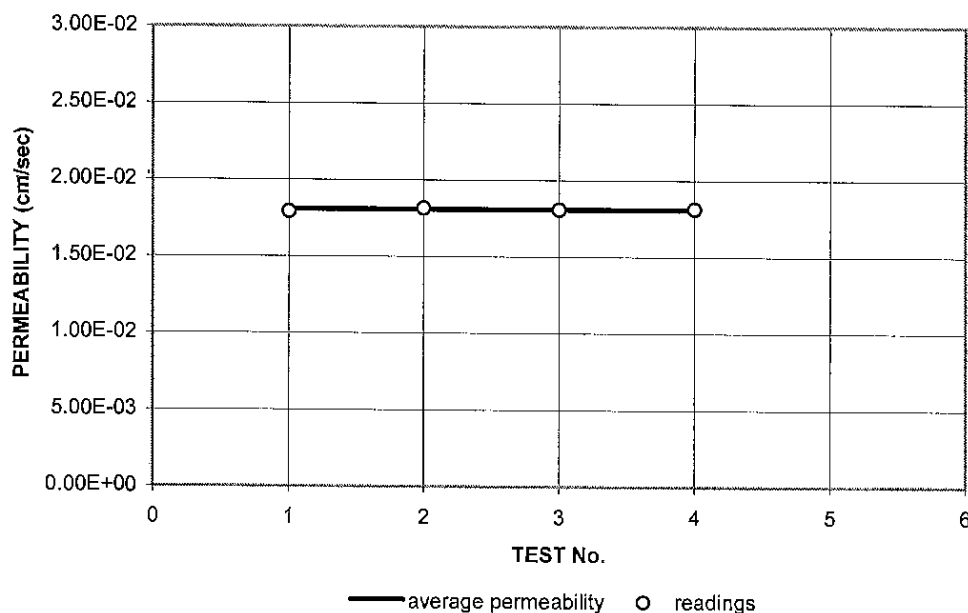
Terracon

Client: WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 5473

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head (cm)	Flow Volume (cm ³)	Elapsed Time (s)	Calculated Permeability (cm/s)
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)				
1	14.8	20.1	50		5.3	50	58.7	1.79E-02
2	14.8	20.1	50		5.3	50	57.9	1.82E-02
3	14.8	20.1	50		5.3	50	58.2	1.81E-02
4	14.8	20.1	50		5.3	50	58	1.81E-02
Average								1.81E-02

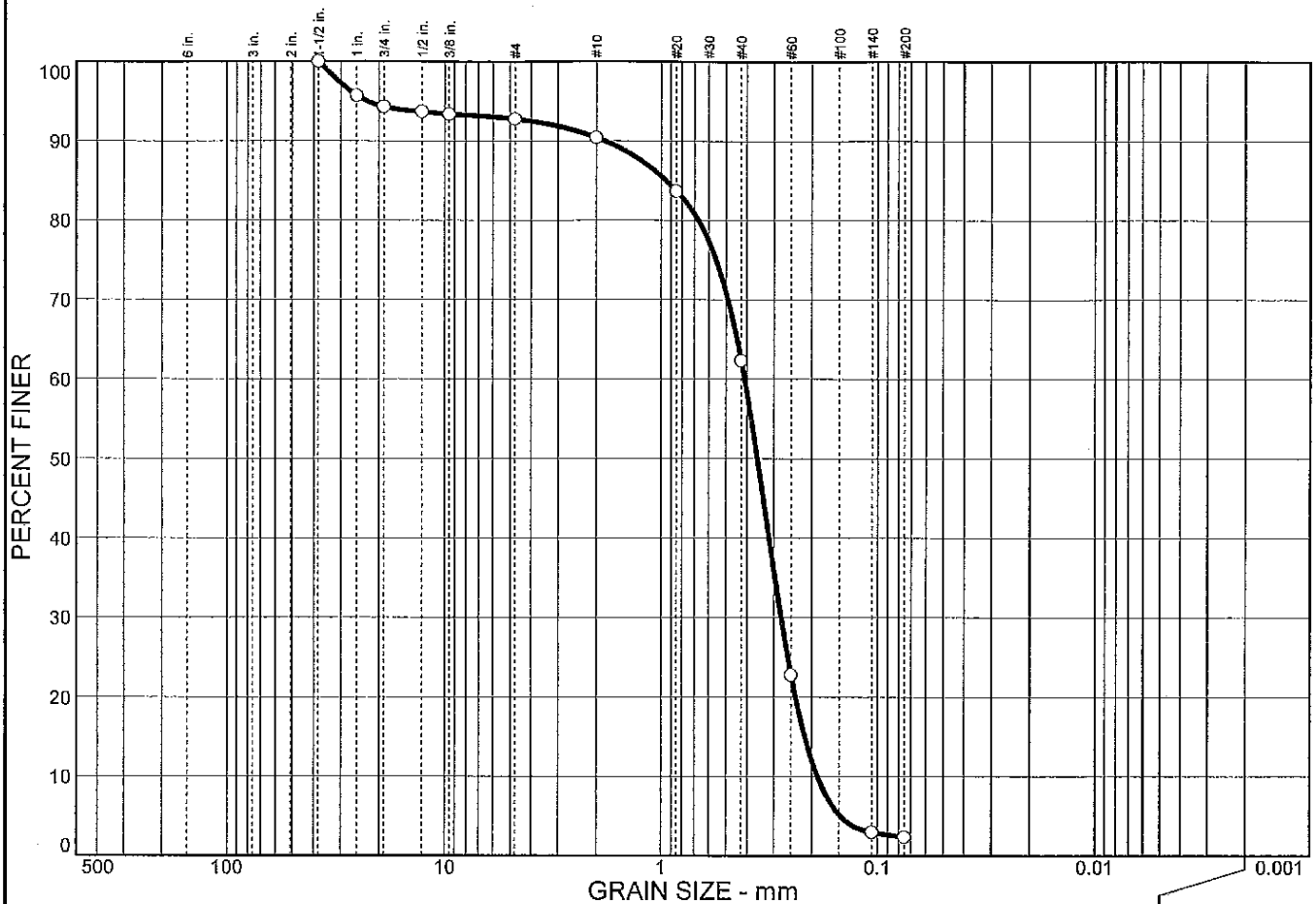
Specimen Conditions

Diameter D (in)	4.5	Weight of Specimen (gms)	2948.0
Length of Specimen (in)	7.5	Density of Specimen (pcf)	94.2
Length of Flow (in)	4.5	Approximate Porosity(%)	44.1

Material Description	Remarks
Carbonate Content (%)	
USCS	
Water Content (%)	

Project Name		WM TWO PINE-CELL 3 CQA		Tested by	FCE	Review. by	TGG
Client	WM	W.O.#	35097116	CONSTANT HEAD PERMEABILITY TEST			
Sample Number	S-5473						
Sample Location	PS-1						
Date	28-Jul-09	Lab No.	5473				

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	7.2	90.4	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	95.7		
.75 in.	94.3		
.5 in.	93.7		
.375 in.	93.4		
#4	92.8		
#10	90.4		
#20	83.7		
#40	62.3		
#60	22.8		
#140	3.0		
#200	2.4		

* (no specification provided)

Material Description

Tan Poorly graded sand

Source: DeSoto Sand

Atterberg Limits

PL=

LL=

PI=

Coefficients

D₈₅= 0.950

D₆₀= 0.410

D₅₀= 0.358

D₃₀= 0.278

D₁₅= 0.216

D₁₀= 0.188

C_u= 2.18

C_c= 1.00

Classification

USCS= SP

AASHTO=

Remarks

Sample No.: CS-1

Source of Sample: 6319

Date: 9-2-09

Location:

Elev./Depth:

Terracon

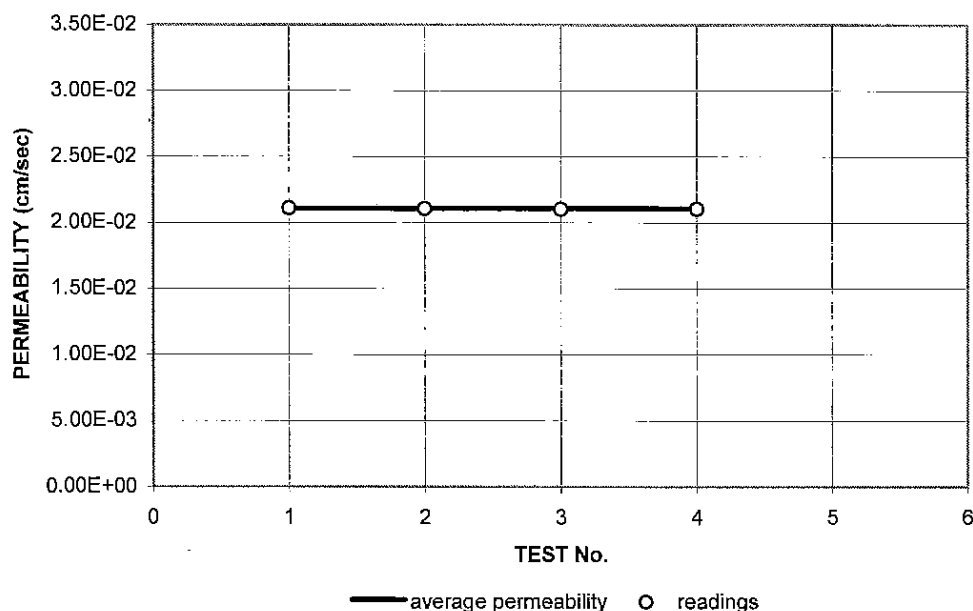
Client: WASTE MANAGEMENT INC

Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 6319

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head (cm)	Flow Volume (cm ³)	Elapsed Time (s)	Calculated Permeability (cm/s)
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)				
1	14.9	20.5	100		5.6	100	94.3	2.11E-02
2	14.9	20.5	100		5.6	100	94.5	2.11E-02
3	14.9	20.5	100		5.6	100	94.8	2.10E-02
4	14.9	20.5	100		5.6	100	94.6	2.10E-02
Average								2.10E-02

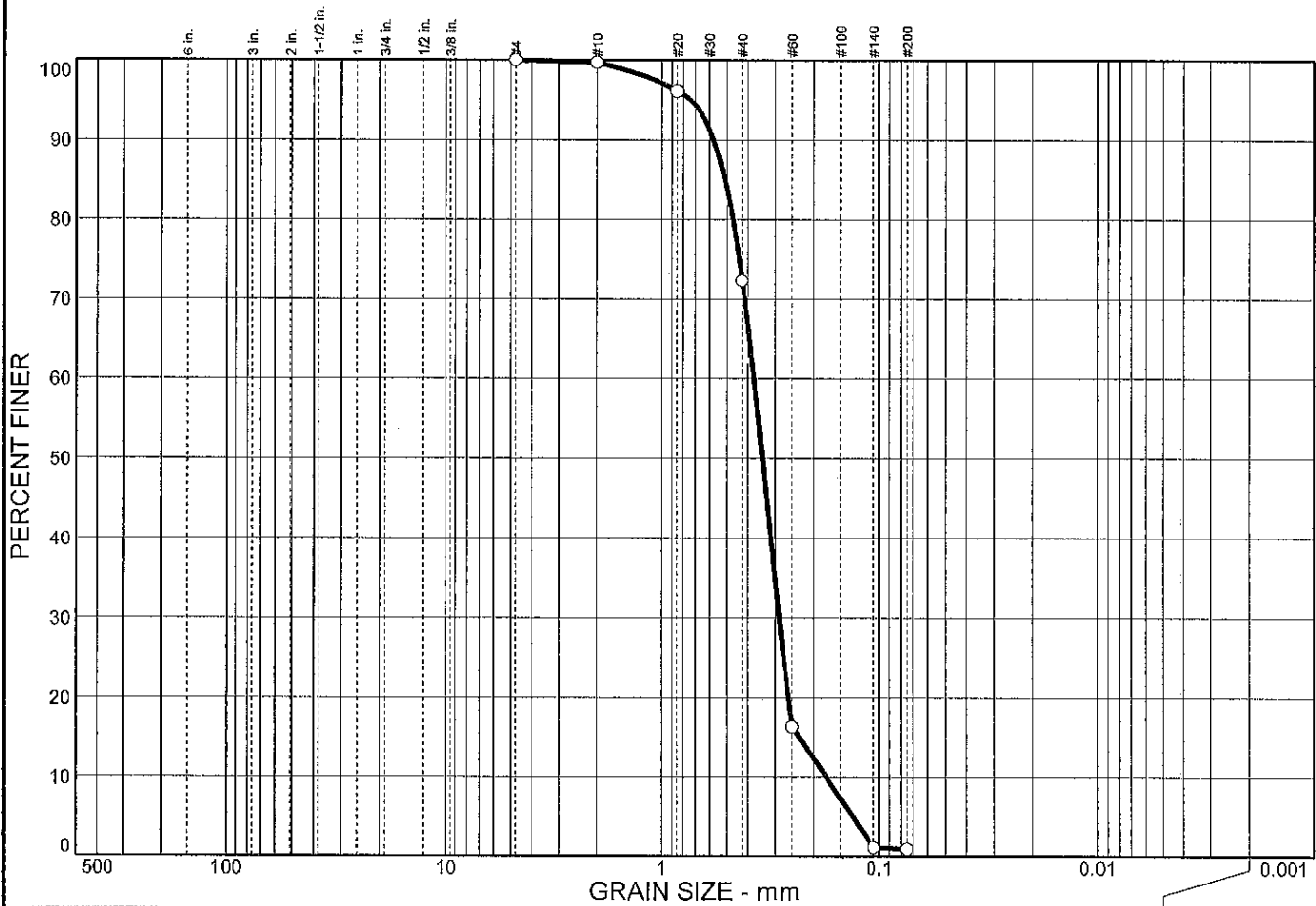
Specimen Conditions

Diameter D (in)	4.5	Weight of Specimen (gms)	3320.0
Length of Specimen (in)	7.5	Density of Specimen (pcf)	106.0
Length of Flow (in)	4.5	Approximate Porosity(%)	37.1

Material Description	Remarks
Carbonate Content (%)	Source: DeSoto Sand
USCS	
Water Content (%)	

Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Review. by	TGG
Client	WM	W.O.#	35097116	CONSTANT HEAD PERMEABILITY TEST 		
Sample Number	S-6319					
Sample Location	CS-1					
Date	31-Aug-09	Lab No.	6319			

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	99.1	0.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	96.1		
#40	72.3		
#60	16.3		
#140	1.1		
#200	0.9		

* (no specification provided)

Material Description
 Tan Poorly graded sand

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₈₅= 0.512 D₆₀= 0.375 D₅₀= 0.343
 D₃₀= 0.288 D₁₅= 0.232 D₁₀= 0.175
 C_u= 2.14 C_c= 1.26

Classification
 USCS= SP AASHTO=

Remarks

Sample No.: CS-2
Location:

Source of Sample: 6546

Date: 9-14-09
Elev./Depth:

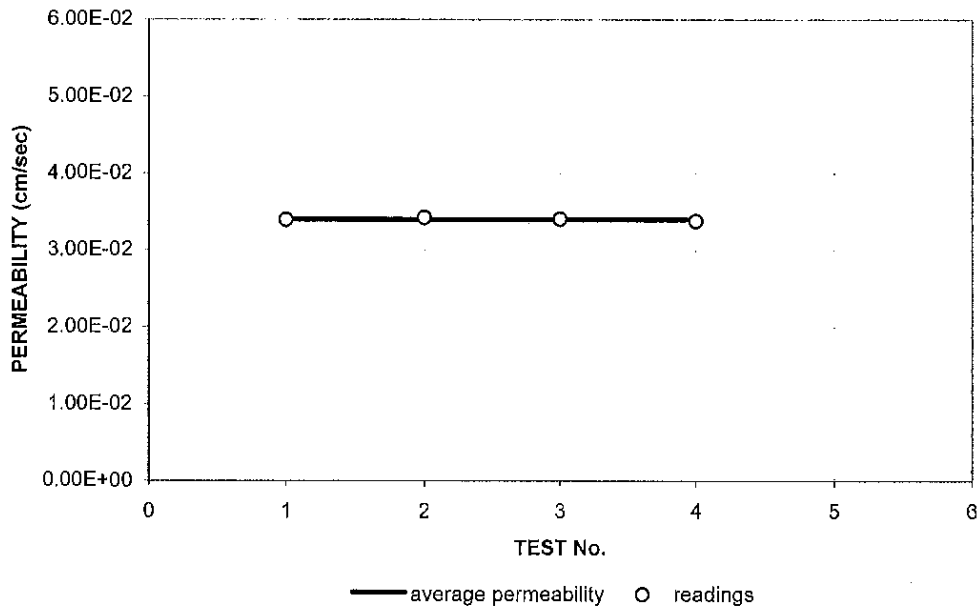
Terracon

Client: WASTE MANAGEMENT INC
Project: WM TWO PINE CLOSURE PLAN CELL 3 CQA
NORTH LITTLE ROCK, AR

Project No: 35097116

Figure 6546

CONSTANT HEAD PERMEABILITY TEST



Test Specification: ASTM D 2434

Test No.	Manometers		Water Levels		Water Head (cm)	Flow Volume (cm ³)	Elapsed Time (s)	Calculated Permeability (cm/s)
	H1 (cm)	H2 (cm)	L1 (cm)	L2 (cm)				
1	15.1	20.6	100		5.5	100	59.7	3.39E-02
2	15.1	20.6	100		5.5	100	59.2	3.42E-02
3	15.1	20.6	100		5.5	100	59.5	3.41E-02
4	15.1	20.6	100		5.5	100	60	3.38E-02
Average								3.40E-02

Specimen Conditions

Diameter D (in)	4.5	Weight of Specimen (gms)	2990.0
Length of Specimen (in)	7.5	Density of Specimen (pcf)	95.5
Length of Flow (in)	4.5	Approximate Porosity(%)	43.3

Material Description	Remarks
Carbonate Content (%)	
USCS	
Water Content (%)	

Project Name	WM TWO PINE-CELL 3 CQA		Tested by	FCE	Review by	TGG
Client	WM	W.O.#	35097116	CONSTANT HEAD PERMEABILITY TEST Terracon		
Sample Number	S-6546					
Sample Location	CS-2					
Date	10-Sep-09	Lab No.	6546			

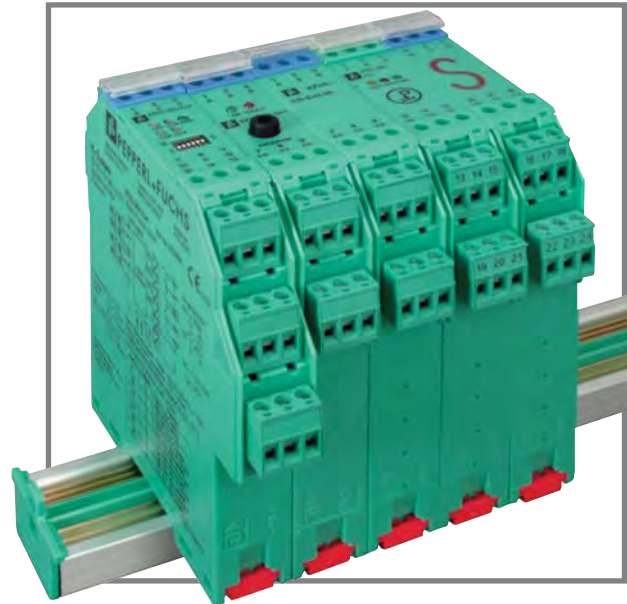
APPENDIX W

CONTRACTOR MATERIAL SUBMITTALS



K-System

Specification Guide



K-System Isolators



Specification Guide

K-System Isolators

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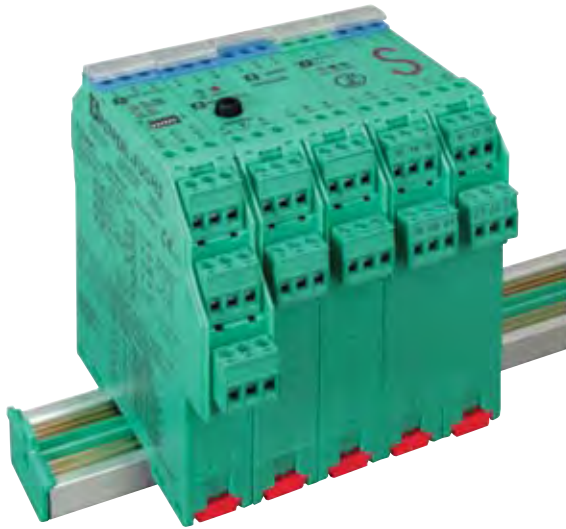
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Specification Guide K-System Isolators Installation and Operation

Introduction

These devices are used in the automation industry for the galvanic isolation of automation signals, such as 20 mA and 10 V unit signals and also for the adaptation and/or standardization of signals. Devices that have intrinsically safe control circuits are used to operate field devices within hazardous areas. The data sheets issued by the manufacturer should be observed.

K-system devices are not suitable for the isolation of signals in power engineering, unless this is specifically referred to in the respective data sheet.

The respective statutory regulations and directives governing the application or intended use should be observed.

Installation and Commissioning in the Safe Area

Installation in the safe area and Div 2/Zone 2

The devices are constructed to satisfy the IP20 protection classification and must be protected accordingly from adverse environmental conditions such as water spray or dirt exceeding the pollution severity level 2.

Only devices with the relevant statement of conformity from an approved test center or covered by the manufacturer's declaration of conformity can be installed in Div. 2/Zone 2.

The individual data sheets indicate whether these conditions are met.

The devices should be installed in a suitable Type or IP rated switch or junction box.

For devices with intrinsically safe circuits, the protected circuit (light blue identification on the device) can be located in the hazardous area. It is especially important to ensure that all nonintrinsically safe circuits are safely isolated. The installation of the intrinsically safe circuits is to be conducted in accordance with the relevant installation regulations.

The respective peak values of the field device and the associated device with regard to explosion protection should be considered when connecting intrinsically safe field devices with the intrinsically safe circuits of K-system devices (demonstration of intrinsic safety).

When intrinsically safe circuits are used in areas made hazardous by dust only appropriately certified field devices must be used.

The certificates of conformity or test certificates should be observed. It is especially important to observe the "special conditions" where these are contained in the certificates.

For More Information . . .

Please refer to Pepperl+Fuchs *2006 Engineer's Guide* for additional information about intrinsic safety technology. It includes an applications guide, specific product specifications, and offers detailed technical information about our process automation products.

Section 1 Installation of Intrinsically Safe and Associated Apparatus

In the United States installation of intrinsically safe and associated apparatus must conform to Article 504 of the National Electrical Code and ANSI/ISA-RP12.06.01. For Canada the Canadian Electrical Code, Part I, C22.1 applies. These standards require that intrinsically safe wiring be separated from non intrinsically safe wiring, and that intrinsically safe wiring, terminals and raceways be clearly labeled. Other considerations such as grounding and shielding requirements are also considered.

The installation of intrinsically safe and associated apparatus must be handled with particular care in order to prevent any intrusion in the intrinsically safe circuits from apparatus and conductors that are not intrinsically safe circuits, if these intrusions could reduce or eliminate the intrinsic safety of the system. To achieve this, it is important to understand the concepts of segregation, separation and clear identification of the intrinsically safe components. In particular:

1. The terminals of the intrinsically safe circuits must be placed at a distance of at least 2 inches (50 mm) from the terminals of the non intrinsically safe circuits, or adequate separators (e.g. grounded metal partitions) must be used.
2. The different types of intrinsically safe circuits do not have to be electrically connected, unless such connection has been specified in the control drawing.
3. The intrinsically safe circuits cannot be metalically connected to apparatus which may have an overvoltage that has been transmitted from power lines or any source of electrical energy. Such a connection is permitted only if it is specified in the control drawing. When different types of intrinsically safe circuits end at the same marshaling terminal, it is advisable to maintain a distance between the relative terminals that is much greater than the 6 mm required by the standard, unless it can be demonstrated that the interconnection between the different types of circuits will not introduce a dangerous energy situation.
4. The properties of intrinsically safe circuits are different if the circuits:
 - Operate at different voltages or polarities
 - Have different barrier grounding points
 - Are certified for different categories or for different gas groups

For the intrinsically safe circuit, installation must be performed so that the maximum allowed value for current and voltage can never be exceeded because of external electric or magnetic fields. For example, proper installation in this case requires the use of cables that are adequately shielded and are separated from the cables of other circuits.

The connection elements—terminal block housing, protective enclosures for cables, the external enclosures for single conductors, and the wiring between intrinsically safe apparatus and associated apparatus—must be clearly marked and easily identified. If a color is used for this purpose, the color must be light blue.

The types of information that must appear, clearly and permanently marked, on the required label for each of the intrinsically safe components are: (1) the identification of the

apparatus and (2) all the requirements necessary to maintain the intrinsic safety of the system (or the essential elements of the design document containing such requirements must be clearly marked).

For devices such as terminal blocks and switches, additional certification or specific marking is not required.

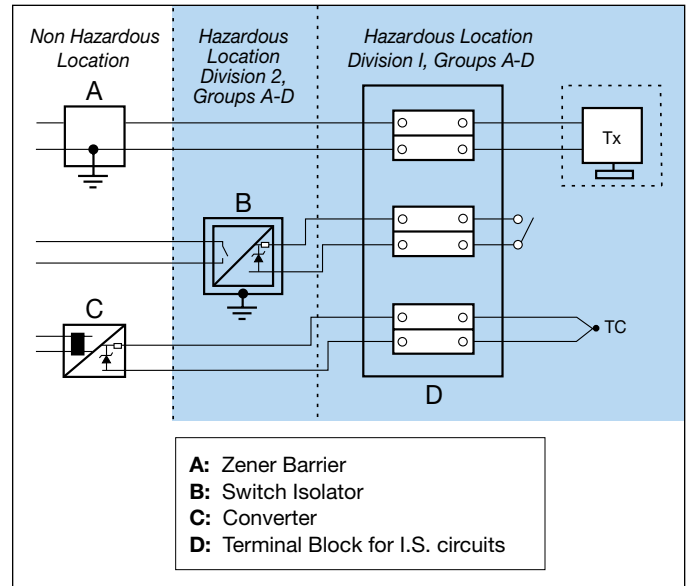


Figure 1.1

Example of different types of intrinsically safe circuits

Protection Ratings for Enclosures

Indoor enclosures

Required by the standards for enclosures of intrinsically safe and associated apparatus, Type 1 is the minimum degree of protection for enclosures that are installed in indoor and/or protected areas. (refer to the *Additional Information* section for a detailed presentation of Type protection ratings).

Outdoor enclosures

For outdoor enclosures, a protection degree of Type 4 or 4X is required. It is important to consider protection ratings of enclosures for intrinsically safe and associated apparatus in the context of the overall functionality and safety of the plant.

The *Additional Information* section presents the European enclosure protection rating system.

Cable Capacitance and Inductance

When designing and installing intrinsically safe systems, keep in mind that capacitance and inductance parameters of the connecting cables are important factors, even if they are not always determining factors.

The capacitance and inductance values of the cable (generally, given in pF/m and μ H/m) should be easily available from the cable manufacturer. However, if there are difficulties in obtaining this data, the following values can be hypothesized (but only in an extreme situation).

Capacitance: 60 pF/ft (200 pF/m) - Inductance: 0.2 μ H/ft (1 μ H/m)

As an alternative to the inductance, another characteristic of the cable, the inductance/resistance ratio (L/R), can be used and is normally given in $\mu\text{H}/\Omega$. This parameter permits more flexibility in the cable installation process.

Refer to Figure 1.2 for examples of cable installation and to Figure 1.3 for examples of wiring in small enclosures containing associated apparatus.

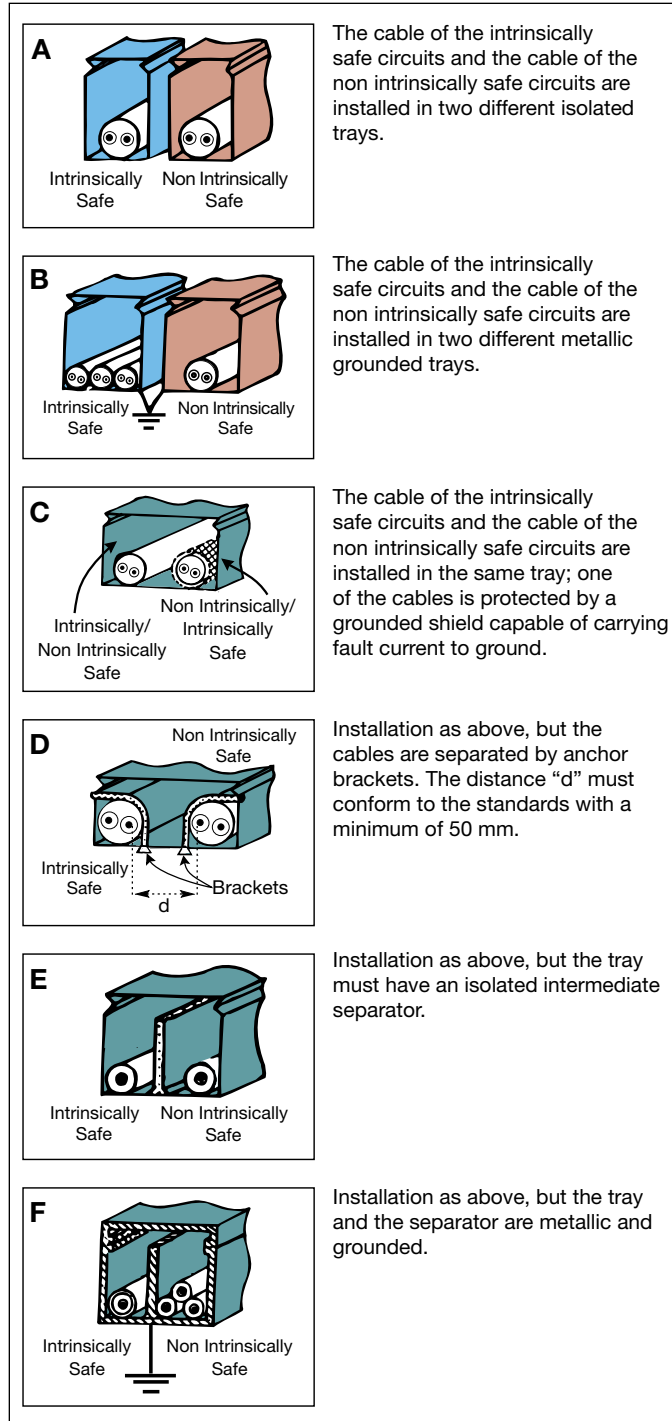


Figure 1.2

Examples of cable installation

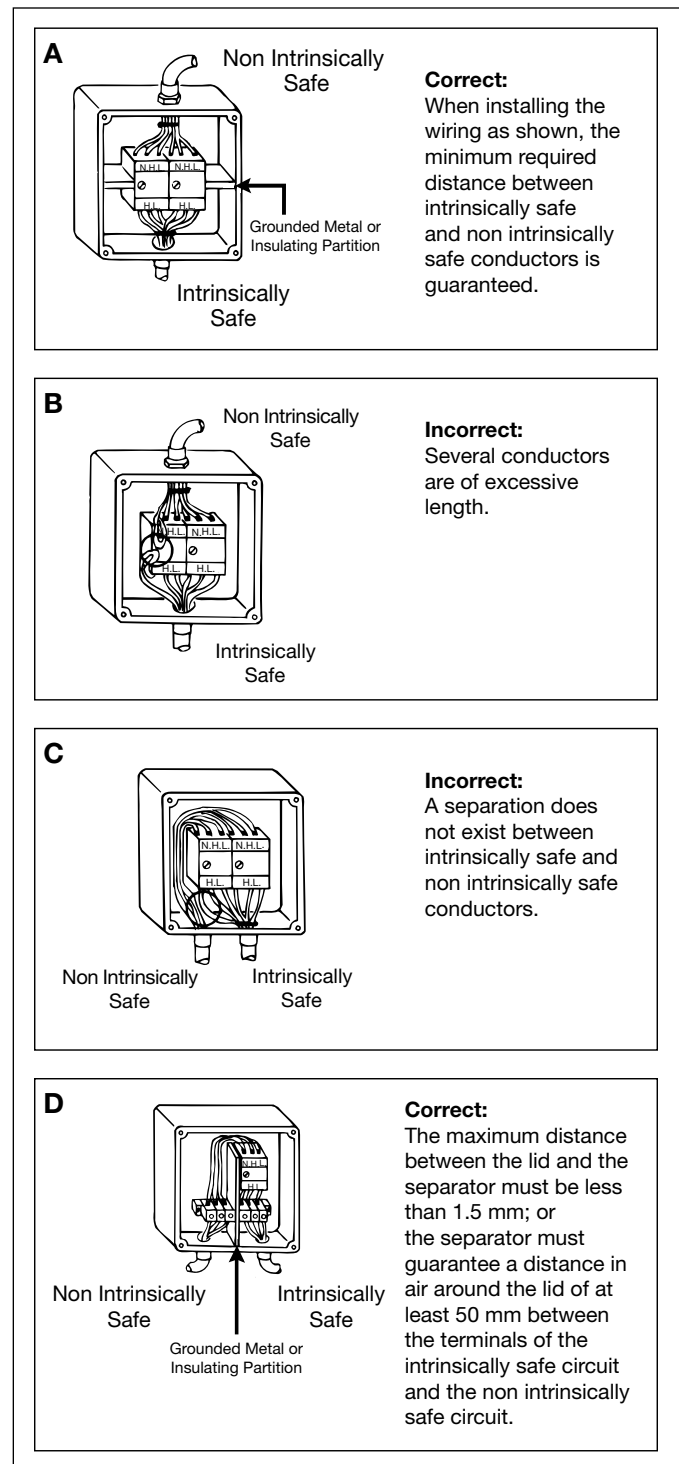


Figure 1.3

Examples of wiring in small enclosures containing associated apparatus

Grounding of Intrinsically Safe Plants

Intrinsic safety standards require that certain points of the system must be grounded and others must be isolated from ground. Generally, the grounding of intrinsically safe circuits is required to prevent or even to reduce the probabilities that excessive energy levels can be generated in the hazardous location.

The isolation from ground of parts of the circuit is required to prevent the possibility of having two grounded points with a different potential and the possible circulation of a high current.

It is also a requirement of intrinsic safety that only one point can be grounded, while the rest of the circuit must be isolated from ground (500 V_{ac} min).

The grounding of intrinsically safe circuits must be accomplished with a conductor that is isolated from any other plant grounds and connected to the reference ground system.

ANSI/ISA-RP12.06.01 has become the authority in the United States on the installation of intrinsically safe equipment. Refer to the applicable standards for grounding practices in other countries.

Grounding of Passive Barriers

From an intrinsic safety point of view, the effective functioning of passive barriers is linked to their capability of diverting to ground the dangerous energy coming from the non hazardous instrumentation devices on which they are connected.

For this reason, it is very important that the ground connection of the passive barrier is made to an equipotential ground system (refer to Figure 1.4).

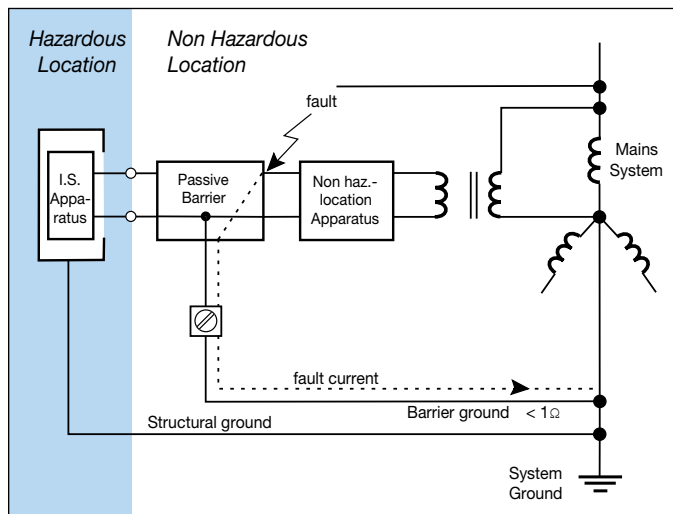


Figure 1.4

Schematic of a grounded passive barrier

The ground connector must be mechanically and electrically reliable and be able to reduce the fault current or the sum of the fault currents, if more barriers are connected to a single-ground bus.

The connecting cable used in grounding the barriers must be at least No. 12 AWG (American Wire Gauge).

The allowed resistance between the ground terminal of the most distant barrier and the isopotential ground point must be less than 1Ω

Barrier ground connections must be separated from any other plant grounds and must be connected to a ground system at only one point.

The required condition of the only ground point implies that a passive barrier cannot be used on interfacing sensors or hazardous location apparatus containing grounded or poorly isolated circuits (i.e., thermocouples with grounded junctions or non isolated transmitters).

The generally accepted practice differs, however, because an equalization conductor (bonding) of the ground potential is usually found in a hazardous location, as shown in Figure 1.5.

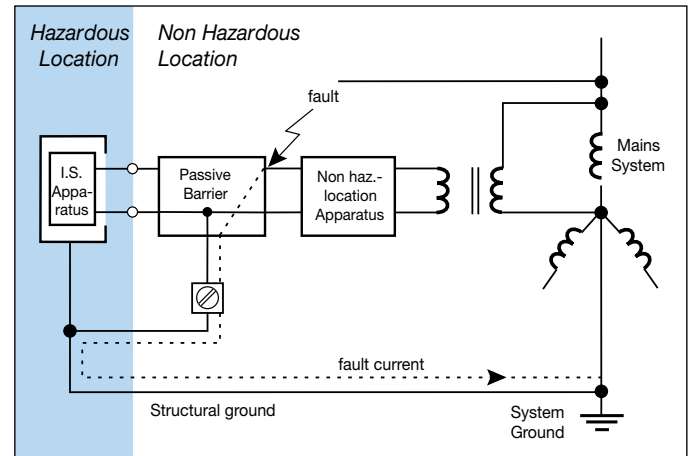


Figure 1.5

Schematic of a ground connector for a passive barrier (used only in Germany)

The fault current, following the route shown, can increase the ground potential of the hazardous location circuits in comparison to the one of the reference ground system. This does not represent a dangerous situation because all of the metallic structures in a hazardous location are connected to the equalization conductor, resulting in an isopotential state. This type of connection is permitted for Zones 1 and 2 in Germany. For Zone 0 applications, the use of galvanic separation, independent from the degree of isolation of the hazardous-location apparatus, is mandatory.

Grounding of Shielded Cables

The use of shielded cables for connecting the hazardous location sensors or transmitters with the non hazardous location control and measurement apparatus is widespread.

From a functional point of view, the shield's purpose is to create an equipotential zone around the conductor's capacitive coupling with that of other conductors. This is only true if the shield is connected to a grounded reference potential.

The shield should be grounded at only one point—preferably, at the system's ground point. If the shield is grounded at two non equipotential points, the current could circulate in the shield, preventing functionality. Therefore, a shielded cable must be

provided with an extra isolating coat above the shield to prevent accidental ground contacts.

For intrinsically safe apparatus, the shield acts as another conductor between the hazardous and non hazardous locations and could become the fault current route if the cable is damaged. From this point of view, the principle of isolating the circuit in hazardous locations and grounding it in non hazardous locations can also be applied to the shield.

For passive-barrier applications, the shield can be locally grounded if the galvanic isolation is not damaged by this connection. This means that the two shields at the two sides of the isolation device must not be interconnected.

For applications where shielding is part of the segregation technique between different types of intrinsically safe circuits (i.e., multipolar cables), the reference ground connection of the shields must be the same as the ground connection of passive barriers (refer to Figure 1.6).

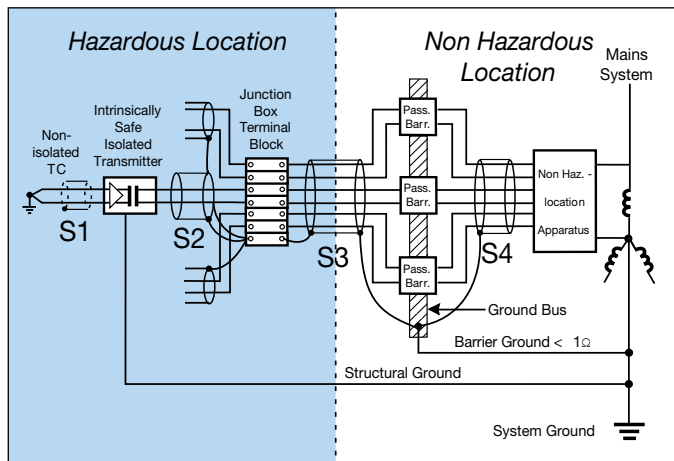


Figure 1.6

Example of shield ground connections

For functional reasons, the S1 shield is connected to the same grounding point as the measuring circuit. This must not be connected to the transmitter's metallic parts in order to prevent the second-circuit ground connection, which is not permitted by the intrinsic safety protection method.

Since the purpose of the field transmitter is to galvanically isolate the thermocouple's circuit from instrumentation in non hazardous locations, there must be no connection between shields S1 and S2.

Shields S2 and S3 provide the shielding of the connection between the transmitter and the barrier. They are interconnected in an isolated point of the junction box terminal block.

S3 is also connected to the barrier's ground bus that, by means of a separate conductor, is connected to the reference ground point.

Shield S4 completes the shielding of the system and is not very important from a safety point of view. It is connected to the shield's reference point, which is represented by the ground bus.

For this type of connection, it is necessary that Shield S2 be properly isolated from the transmitter's metallic structure; otherwise, a situation as shown in Figure 1.7 can occur.

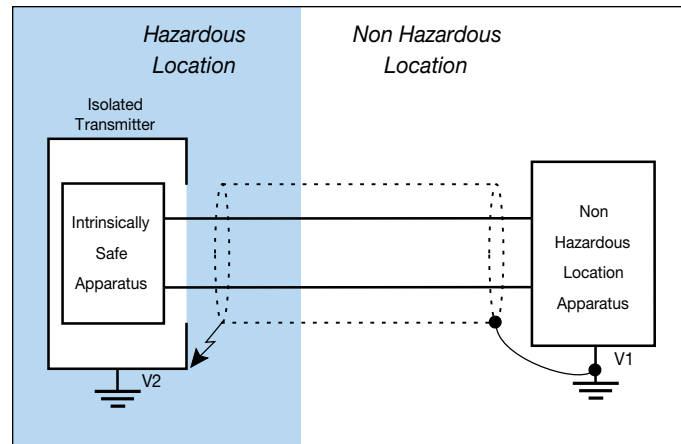


Figure 1.7

Possible dangerous situation for grounding of non hazardous-location shields

When isolation no longer exists between the shield and the transmitter's enclosure, an excessive energy level could be present in a hazardous location if ground potential V1 is different from V2. Since the fault current is limited only by the resistance of the shield and the one existing between V1 and V2, the generated spark could ignite the surrounding potentially dangerous atmosphere.

This situation can be prevented by grounding the shield in the hazardous location; therefore, a spark could occur in the non hazardous location without causing a fire or explosion.

Section 2 Maintenance of Safe Plants

No method of protection is completely safe and human-error proof. Proper maintenance that includes a rigorous initial inspection, verification, and subsequent periodic inspections and repairs is extremely important for the safety and economical management of any instrumentation plant, and becomes fundamental in plants where the danger of fire or explosion exists.

To reduce the risk of catastrophic human errors, it is also important to permit only authorized and competent personnel to repair explosionproof apparatus—as equipment must not be serviced under power. The following maintenance criteria are presented to give the reader a general understanding of what is involved in order to maintain an industrial facility relative to safety. This material is not intended to replace the applicable safety standards.

After the installation and completion of each plant, it is necessary to perform the following three types of inspection/maintenance activities:

1. Initial inspection
2. Programmed maintenance (periodic inspections and repairs)
3. Apparatus failure and repairs

Initial Inspection

Prior to acknowledging and classifying the presence of flammable mixtures and performing the startup of a newly completed, modified or expanded plant containing hazardous locations, a

complete inspection of the plant by qualified personnel must be carried out. An inspection must also be performed if the classification of the hazardous location has been modified. The inspection personnel must provide documentation that verifies the following:

- The adequacy of the entire plant
- The adequacy of all the field elements
- The adequacy of all the associated apparatus
- The agreement between safety parameters and the inter-connected apparatus

Adequacy of the Entire Plant

It is necessary to verify that the protection methods used, in their entirety, are compatible with the hazardous locations and the gas groups present and that the technical rules of each protection method have been strictly followed.

Explosion-proof installations

Specifically, for an explosion-proof installation, verify that:

1. All of the plant's components and electrical lines located in a hazardous location are of an explosion-proof type, with continuity, up to the exit point of the hazardous location or are directly protected with other authorized methods that are properly installed.
2. The apparatus are correctly anchored and do not exert force on the connecting pipes, causing cracks or deformation near the connection points.
3. The locking joints conform to the standard and are properly tightened and sealed.
4. The conductors leading into the junction boxes are firmly anchored but do not risk abrasion or cuts in the isolation.
5. There is no formation or accumulation of condensation in the pipes and/or the enclosure of the apparatus.
6. The explosion-proof enclosures have a reliable external ground connection.
7. If mixed protection methods are used, these methods must be authorized for the specific type of hazardous location and groups of gases and must be properly installed.
8. Adequate space has been allowed for easy removal of the lid during maintenance activities.

Intrinsically safe installations

For intrinsically safe installations, verify that:

1. All of the electrical conductors that route, even marginally, into a hazardous location and are not protected with explosion-proof pipes, and pertain exclusively to intrinsically safe circuits (or, where permitted, increased safety), are properly protected for the respective hazardous locations and gas groups and are installed in conformity with the installation standard.
2. None of the intrinsically safe circuit conductors are mixed with the non intrinsically safe circuit conductors (e.g., multiconductor cables) without respecting, along the entire route, the safety distance and segregation from other conductors and/or terminal blocks, and also its identification as an intrinsically safe circuit.

3. Conductors of different types of intrinsically safe circuits (especially ones with different safety parameters) are properly separated and isolated from each other.
4. If diode safety barriers (passive or non isolated) are used, there exists an isopotential system with plant grounds conforming to the applicable standard, and that the continuity toward ground is guaranteed for each apparatus.
5. Non hazardous-location apparatus that are directly powered with voltages larger than 250 V are not present, unless they are protected and certified for that use.
6. Shields of conductors associated with diode safety barriers are connected to the isopotential ground.
7. The reciprocal and toward-ground isolation, where required, of all intrinsically safe circuits conform to the standard. (Use a test instrument that does not generate more than 1.2 V and 0.1 A, or 25 mW if there is a presence of flammable mixtures in the plant, or shut down the plant and be sure that flammable mixtures are not present.)
8. The markings that specifying different measuring and/or regulation loops are clear and avoid confusion between different types of barriers with different parameters.
9. The barrier input terminals are not confused with the output terminals.
10. Installation conforms to the manufacturer's control drawing.

Adequacy of all the Field Elements

Demonstrate that all of the apparatus installed in hazardous locations are free from the risk of fire or explosion by: (1) verifying that the apparatus are connected with simple devices ($V_{max} \leq 1.2$ V; $I_{max} \leq 0.1$ A; $P_{max} \leq 25$ mW), or (2) verifying that a protection method is being used that is authorized for the specific installation zone and compatible with the gas groups and temperature class.

Explosion-proof apparatus

Specifically, for explosion-proof apparatus, verify that:

1. All of the apparatus are installed in Division 2, or Division 1 with certain restrictions. (In Europe Zone 1 or Zone 2; Zone 0 does not permit the installation of electrical apparatus using only the explosion-proof protection method.)
2. Certification is compatible with the gas group and surface temperature class of the flammable mixture present.
3. None of the explosion-proof points have been damaged during transport or installation.
4. All of the openings toward the outside of the enclosure have been used (flame break joint, conduit [pipe] joint) or properly sealed with explosion-proof caps that are properly tightened.
5. All of the removable lids are integral, closed and tight (lid bolts all present and tight; screw-type lids tightened completely and equipped with devices against accidental unscrewing).
6. All of the threaded junctions are integral and protected against corrosion.
7. Each enclosure has an external ground connection properly tightened and efficient.

8. Warnings stating that the power should be shut down before opening are always present on the lids and/or the labels.

Intrinsically safe apparatus

For intrinsically safe apparatus or for simple electrical devices, verify that:

1. They have, where required, a type of certification that is suitable for their hazardous location and the gas groups corresponding to the flammable mixtures present.
2. They have, where applicable, a surface temperature classification compatible with the flammable mixture present (e.g., T6).
3. They are exclusively connected to intrinsically safe circuits, in the manner specified by the certification documents, especially for the eventual connection to alarm safety apparatus, and that the safety parameters of the connecting cables have been respected.
4. They are, where applicable, powered or interconnected with associated apparatus having safety parameters compatible with the apparatus and the proper protection method.
5. They have a grounded enclosure, or if a plastic enclosure is used, that the risk of electrostatic discharge is not present (warning labels, etc.) and, if required, that they are installed with the proper environmental protection.
6. They do not have points of the circuit grounded or poorly isolated toward ground, only if connected with diode safety barriers without galvanic isolation, with the exception of the equipotential ground connection on the barrier.
7. The eventual loosening of cable clamps or conductor input joints does not jeopardize the tightness of the enclosure against water and corrosive atmospheric elements.

Adequacy of all Associated Apparatus

For the adequacy of the associated apparatus, verify that:

1. They have been exclusively installed in a protected non hazardous location, unless other protection methods that are suitable for the hazardous location have been used.
2. The type of certification is compatible with the intrinsically safe circuit to which they are connected, according to the hazardous location and the gas group.
3. They have safety parameters that are compatible with both the connection cable and the intrinsically safe apparatus to which they are connected.
4. Separation and identification of the intrinsically safe circuit exists along the entire connection route, as required by the standards.
5. They have correctly rated and installed internal fuses and that an external protection device (i.e., isolator breaker) is present on the main power line.

Agreement between the Safety Parameters and the Associated Apparatus

Any apparatus that is certified or recognized as safe can become unsafe if they are used in connection with other apparatus, even if these apparatus are certified as safe. Therefore, use the

interconnected apparatus documentation to verify that the entire connections are specified and permitted by the certification, and that parameters derived by the interconnection, remain compatible with values that are characteristic of the cable and the field elements connected.

Section 3 **Programmed Maintenance**

Programmed maintenance prevents the deterioration of apparatus, both functionally and from a safety point of view. It includes the periodic inspection and the repairs (if any) which are made as a result of the inspection. A record must be kept of the type of maintenance performed, the date and the results.

Periodic Inspection for Explosion-proof Apparatus

To perform a periodic inspection to determine the safety of explosion-proof apparatus, verify that:

1. All of the explosion-proof lids are tightly screwed or bolted, depending on the type. If bolted, all of the bolts must be fitted properly and tightened.
2. Signs of deformations, cracks or corrosion in the flanged joint, tightening lid thread and pipe union are not present.
3. The enclosure's external grounding terminals are tightened, and that the grounding conductor is integral and guarantees a good ground connection.

Calibration Verification: Prior to performing calibration verification on an explosion-proof enclosure, the power supply must be turned off, or ensure that there are no flammable mixtures present around the enclosure. Turning off the power supply makes it impossible to verify the proper functioning of the apparatus; therefore, it is preferable to eliminate the presence of flammable mixtures and perform the calibration with the power on. (This can be determined by on-site testing with a combustible gas detector.)

1. During all of the subsequent operations, continuously verify with the gas detector the absence of flammable mixtures.
2. Turn off the power to the apparatus, and open the cover to access the input/output connection and calibration regulations.
3. Connect the calibration instrument to the input/output connection, according to the instructions on the apparatus. With the combustible gas detector, verify the absence of flammable mixtures and restore the power.
4. Following the manufacturer's instructions, verify the calibration and adjust it if necessary.
5. Turn off the power and reconnect the original connections.
6. Close the lid and verify its tightness.
7. Restore the power for normal functioning.

Periodic Inspection for Intrinsically Safe Apparatus

For intrinsically safe apparatus, certain inspections can be performed without a plant shutdown. For each inspection, however, verify that situations of real or potential dangers are not generated for the following reasons:

1. The instruments or verification connections do not cross the hazardous (I.S.) and non-hazardous terminals of the

barriers.

2. The ground connections are not interrupted while the intrinsically safe circuits are powered or are connected to other powered circuits.
3. The apparatus, used for the test, are certified and suitable to operate in a hazardous location with explosive mixtures present.
4. The apparatus used for the test do not introduce dangerous voltages or currents in the circuit. This is not necessary in order to test apparatus according to the standard.
5. The conductors, temporarily disconnected for the test, do not remain free to cause unwanted contacts, but are clearly identified and firmly anchored to an electrically safe point (e.g., isopotential grounded system).

When possible, verification of apparatus should be performed by removing them from the plant (substitution is advisable if spares are available) and safely testing them in a lab that is located in a non hazardous location. This procedure is greatly simplified if the apparatus are equipped with plug-in type connectors that allow removal of the card without touching the cable connections.

Hazardous locations

Generally, the maintenance procedure in a hazardous location should be limited to the following:

1. The disconnection and removal (or substitution) of apparatus and part of the connections
2. Calibration adjustment of the apparatus
3. The use of permitted and specified test apparatus
4. Other permitted or specified maintenance activities

Non hazardous locations

Although it may appear that there is less danger when inspecting or repairing apparatus in a non hazardous location, this is not the case. In fact, a more dangerous situation could develop due to the fact that often, less care is taken because of the non hazardous classification. It is difficult to realize that an erroneous operation in a non hazardous location can generate an explosion in a hazardous location by means of the interconnected circuit.

Passive barriers in non hazardous locations

Therefore, for circuits protected by diode safety barriers, verify that:

1. The ground conductor of each barrier is properly tightened and maintains a total resistance up to the isopotential ground point less than or equal to 1Ω
2. The safety circuits (measured by non repetitive samples) are isolated from other ground points, and the isopotential point to which they are connected is according to the standard.
3. The separating distances of safety terminal blocks and conductors are respected.

Active barriers in non hazardous locations

For circuits protected by galvanic isolation barriers, verify that:

1. The separating distances of safety terminal blocks and conductors are respected.

Calibration Verification: As previously stated, intrinsically safe circuits have the advantage of permitting maintenance activities to be performed while the power is on (usually the maximum voltage present is 28 V). However, with circuits protected by barriers, the possibility always exists that the barrier could be permanently short-circuited. This could cause the fuse to blow, rendering the barrier useless. In other apparatus, the risk of accidental improper contact remains. Therefore, when possible, it is advisable to remove the apparatus (this is particularly easy with instruments with plug-in type connectors) and proceed with verification in a lab. Where it is impossible to remove the apparatus from the installation, the following must be performed:

1. Disconnect the input/output conductors and, after identifying them, connect them temporarily to the isopotential ground; or, if already grounded, keep them isolated and anchored to the free terminals of a supporting terminal block.
2. Connect a calibrator to the input and a calibration indicator to the output. Both must be certified for the division and gas group in which they are used.
3. After completing the verifications and calibrations, restore both the input and output conductors with extreme care.

Apparatus Failure and Repairs

Repair of Explosion-proof Apparatus

When there are functioning abnormalities in an explosion-proof instrumentation plant, the following must be performed in the shortest time possible:

1. Determine the cause of the apparatus failure, or abnormality.
2. Isolate and determine the anomalous part of the plant.
3. Substitute, if possible, the malfunctioning components with spares.
4. Repair the malfunctioning components in order to regain proper functioning.

Reducing the time that a plant is shut down for repairs is the key to reducing maintenance costs. Quick and precise determination of the causes and identification of the malfunctioning apparatus become very important when viewed in this way. This can be made easier if precautionary measures that render safe and quick substitution of the components were taken during the design phase.

Using this concept, the best solution can be obtained from the use of:

1. Field and control room instrumentation of the modular and plug-in type, making it easier to remove the instrument without altering the wiring
2. Adequate inventory of spare components that permit immediate substitution

The determination of the causes of malfunction or failure and the identification of the failed apparatus in explosion-proof plants follow the same general rules as trouble-shooting in standard instrumentation plants. In this case, however, there is a danger of fire or explosion; therefore:

1. Do not perform connections that are not shown in the plant's schematic, unless the risks relative to safety have been analyzed.
2. Do not use test instruments that are not certified for use in the same hazardous location and gas group that the circuits to be analyzed are.
3. Isolate the part of the plant in which the repairs must be performed, and consider the effect of the performed tests on the interconnected circuits.
4. Most importantly, do not cross or eliminate the safety protections that are present in the safety barriers and in other parts of the plant.

The block substitution of the malfunctioning apparatus can be performed without a great deal of risk if the certainty of the correct apparatus insertion in its enclosure exists and eventual polarization keys, purposely placed on the insertion elements to prevent insertion of erroneous modules on a given apparatus, are not altered or forced.

Repair of Intrinsically Safe Apparatus

The repair of defective intrinsically safe apparatus, besides restoring the operative functionality, does not have to compromise in any way the characteristics of intrinsic safety. The most frequently used ways of ensuring that apparatus are intrinsically safe are:

1. Surface distances between the main line and the intrinsically safe circuit
2. Surface distances between two different types of intrinsically safe circuits
3. Protective coats which increase the isolations that are unobtainable with distances only
4. Protective fuses on main and signal transformers, and output circuit barriers
5. Signal and main transformers with dielectric rigidity that has been individually tested, and with distances and isolating materials that are guaranteed
6. Barrier resistors with construction techniques, nominal powers, values and tolerance as per the certification documentation
7. Diode or zener barriers with nominal voltage, tolerance, nominal power and assembly polarity well-defined
8. Optoelectronic coupler that has been certified as a component having surface and internal distances and approved construction techniques
9. Electromagnetic relays that have been certified with guaranteed surface distances between the coil circuits and the contacts and/or terminals for armor ground connections
10. Functional modules, encapsulated or not, that have been certified as components which are compatible with the concept of intrinsic safety

There are many other items that could be added to this list, but they are used less frequently and are too numerous for purposes of this discussion.

None of these protection characteristics can be substituted indiscriminately without having complete documentation and a

great deal of knowledge about the concept and possible problems of intrinsic safety and the way in which intrinsic safety has been used in any particular apparatus.

For the manufacturer of the apparatus, however, it is often impossible to supply all of the documentation necessary for an average maintenance technician to perform, without risk, repairs on intrinsically safe apparatus.

The safer and sometimes less costly solution is to keep a series of spare cards or modules that permit an immediate substitution of the faulty unit. The faulty unit can then be sent to the authorized service dealer where it can be repaired or replaced.

Repair of intrinsically safe apparatus in emergency apparatus

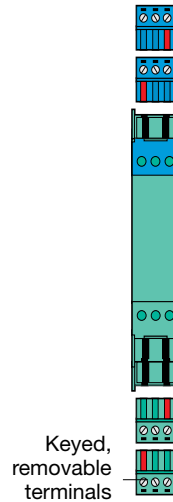
If an intrinsically safe apparatus must be repaired in an emergency situation, give particular care:

1. Not to modify the air and surface distances of the barriers and their components
2. Not to substitute any component that determines its intrinsic safety (usually, these components are marked with shading on the silk screen of the printed circuit boards and on the schematics)
3. Not to substitute the fuses, unless they are substituted with others of identical type (rapid, medium lag, etc.) and nominal current
4. Not to substitute main or signal transformers, unless the substitution is made with identical components that are supplied by the manufacturer of the apparatus
5. Not to substitute certified modules, unless the substitution is made with identical modules that are supplied by the manufacturer
6. In reciprocal positioning of the components and in repositioning eventual isolators or spacing collars that are placed on the component terminals in order to distance them from the printed circuit board
7. In verifying the repaired card or component, to be certain of the complete efficiency of all the intrinsically safe protection
8. In performing an accurate washing of the printed circuit board and restoring eventual protective coatings

Section 4 Power Supplies and Connections

Removable Terminals

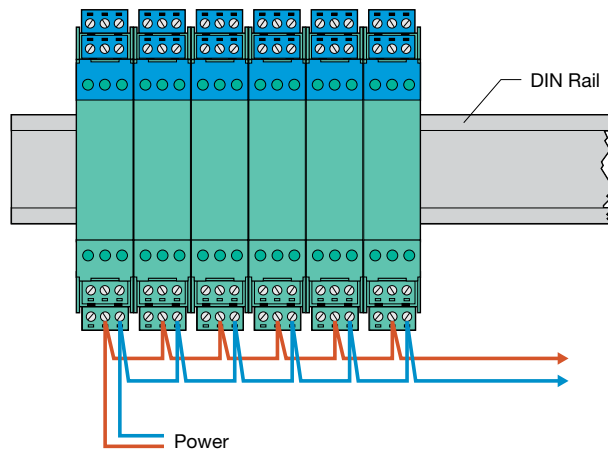
The removable terminals simplify control cabinet construction and allow the units to be replaced while under power. These screwed, cage clamp terminals allow space for the connection of leads with core cross-sections of up to 14 AWG (2.5 mm²). The connectors are coded, so that it is not possible to make an incorrect connection. With the KF-CP terminal block coding inserts, separately available connectors with test sockets or cage spring release terminals can be easily replaced.



Power Supply

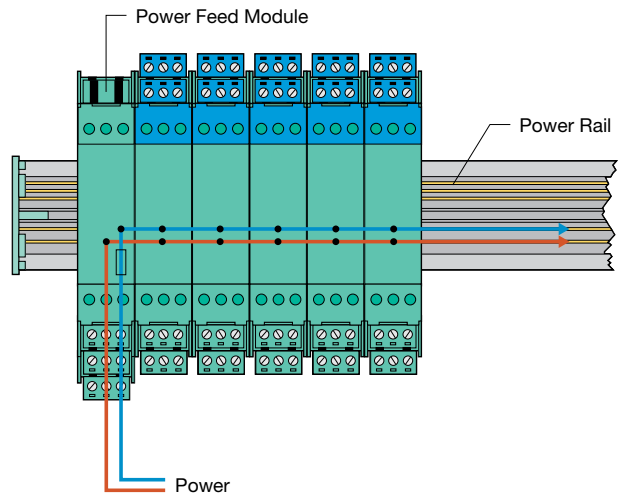
Conventional Power Supply without Power Rail

Conventional power supplies create complicated and expensive wiring systems because after all isolators are connected, more wiring must be added for features such as lead breakage and short-circuit monitoring.



Power Supply with Power Rail

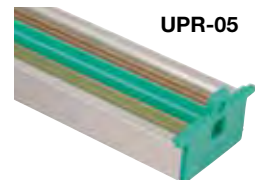
The Pepperl+Fuchs Power Rail eliminates wiring hassles and reduces expenses because two conductors power all isolators connected to the rail. P+F offers a three-conductor version for lead breakage and short-circuit monitoring.



Power Rail

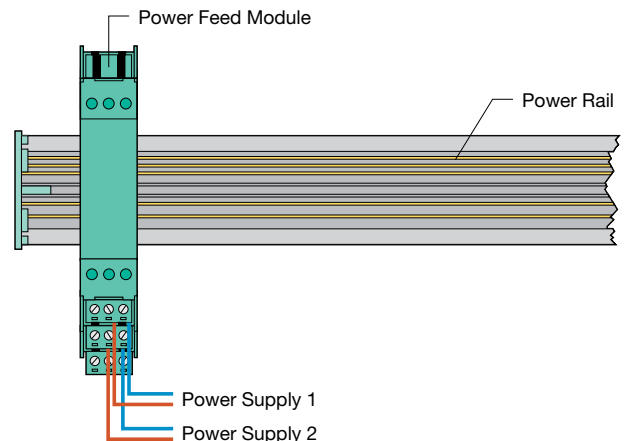
Power Rail snaps directly into a standard DIN rail and contains two conductors that deliver power to the modules. Power is sent through the rail by a power feed module which delivers 24 VDC at 4 A. The module uses a 4 A fuse to protect the barriers. The Power Rail virtually eliminates lead breakage and short circuit, and provides for easy expansion. Power Rail is available in two versions:

- UPR-03 and PR-03 These 3-conductor versions supply power and error signals.
- UPR-05 and PR-05 These models feature 5-conductors, two for power and three for serial data exchange.

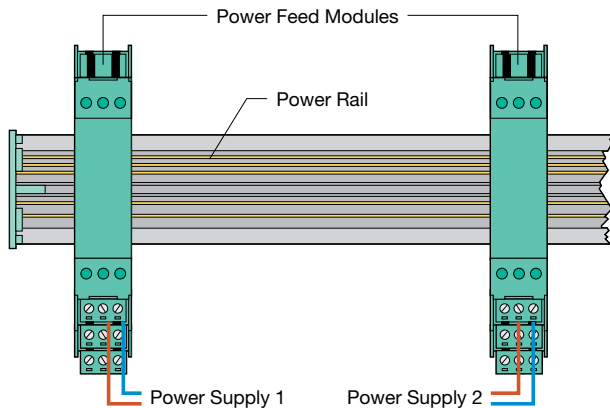


Redundant Power Supplies

Two power supplies with one power feed module can be used for redundancy on Power Rail. See Power Feed Modules for 2 A and 4 A options.

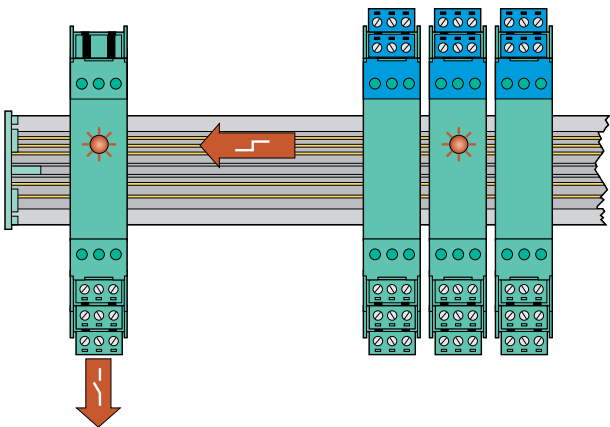


A redundant power supply with two power feed modules offers an even higher degree of safety. If a fuse opens in one power feed module, the second module continues to energize Power Rail. See Power Feed Modules for 2 A and 4 A options.



Collective Error Messaging

Collective error messaging enables lead breakage and short-circuit monitoring for isolator modules without additional wiring expenses. During fault conditions, an interrupt signal from an isolator module such as the KFD2-SR2-Ex2.W transfers to the Power Rail. The power feed module evaluates the signal and processes the interruption to the control system via a relay contact.



Mechanical Data for K-System

Design

Housing sizes:

1. Width 20 mm, height 115 mm
2. Width 40 mm, height 115 mm
3. Width 140 mm, height 103.5 mm (power supply KFA6-STR-1.24.4)

Mounting

1. Panel mounted. The tabs on the bottom of the modules must be extended and anchored to the panel with screws.
2. Power Rail or 35 mm standard DIN rail to EN 50022. Modules snap on for horizontal or vertical mounting.

Housing Material

Makrolon

Flame Resistance Classification

UL 94V - 0

Connection Options

KF-series:

Removable connector with integrated cage clamp terminals for maximum wire size of 14 AWG (2.5 mm²). Torque rating: 4.4 to 5.3 in lbs (0.5 to 0.6 N-m)

KH-series:

Cage clamp connection terminals for maximum wire size of 14 AWG (2.5 mm²).

Torque rating: 4.4 to 5.3 in lbs (0.5 to 0.6 N-m)

Special Features

Removable, mechanically-keyed connectors (KF-Series) ensure proper connection

Ambient Conditions

Climatic specifications according to DIN IEC 721 Class 3K3

Ambient Temperature

Normally -20°C to +60°C (-4°F to +140°F). See individual data sheets.

Storage Temperature

-40°C to +90°C (-40°F to +194°F)

Humidity

Maximum 75% relative humidity, 95% for many modules

Electrical Standards for K-System

Isolators are designed for connection to circuits in Class I, Division 1, Groups A-D and EEx ia IIC Zone 0 unless otherwise noted.

- DC power supply 20-30 V
- AC power supply 120/240 V $\pm 10\%$
- DC Power Rail compatible
- Intrinsic safety isolation in accordance to EN 50020
- Electrical isolation in accordance to EN 50178
- EMC in accordance with EN 50 081-2, EN 50 082-2 and NAMUR NE 21
- LED in accordance with NAMUR NE 44
- Software in accordance with NAMUR NE53
- Switch-on pulse suppression
- Fault signals via Power Rail
- Human/machine interface (HMI) software to VDE/VDI 2187
- Safety devices in accordance with IEC 61508, VDE 0660 Part 209, EN 954, AKs to DIN 19250

Discrete inputs/outputs in accordance with NAMUR

The standard references for these interface have changed many times:

German standard (old): DIN 19234: Electrical distance sensors — DC interface for distance sensors and switch amplifiers; 1990-06.

European standard (old): EN 50227: Low voltage switchgear and control gear — control devices and switching elements — proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1996-10.

German version (old): DIN EN 50227: Low voltage switchgear — control devices and switching elements — proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1997, German nomenclature VDE 0660 part 212.

Current designation: DIN EN 60947-5-6: Low voltage switchgear — control devices and switching elements — proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 2000, German nomenclature. VDE 0660 part 212.

Current IEC designation: IEC 60947-5-6: Low voltage switchgear and control gear — part 5-6: control circuit devices and switching elements — DC interface for proximity sensors and switch amplifiers (NAMUR), 1999.

Insulation coordination for using galvanic isolation in accordance with DIN EN 50178 and DIN/VDE 0106

The K-series devices are built-in devices and electronic apparatus for use in closed electrical operating areas to which only qualified electrical specialists and technicians have access.

The units are rated for use in pollution severity level 2 environments and overvoltage category II, in accordance with DIN EN 50178.

Insulation coordination for devices with Ex-certification

The units are rated for use in pollution severity level 2 environments, in accordance with DIN EN 50178.

The Pepperl+Fuchs KF-ExDuct

The KF-ExDuct from Pepperl+Fuchs has an overall length of 1.8 m and can be used to provide space-saving mounting for up to 90 KF-modules and accommodate the associated wiring. The system and field cables for Ex- and nonEx-signals are easily installed in the integral cable ducts of the KF-rail. No additional cable guides are necessary.

The power supply to the individual modules is normally provided via the Power Rail and can be integrated into the system. The power supply can be connected in two different ways:

1. If a 24 VDC supply is available, the supply to the modules can be by means of a KFD2-EB... power feed module. It is also possible to build up various function groups and to supply these separately via power supply modules. If required, a redundant power supply to the KF-modules can also be provided.
2. If 115/230 VAC is available, one of Pepperl+Fuchs' power supplies can be used to convert the AC voltage to 24 VDC. See "Power Supplies", page 401.

Advantages of the KF-ExDuct

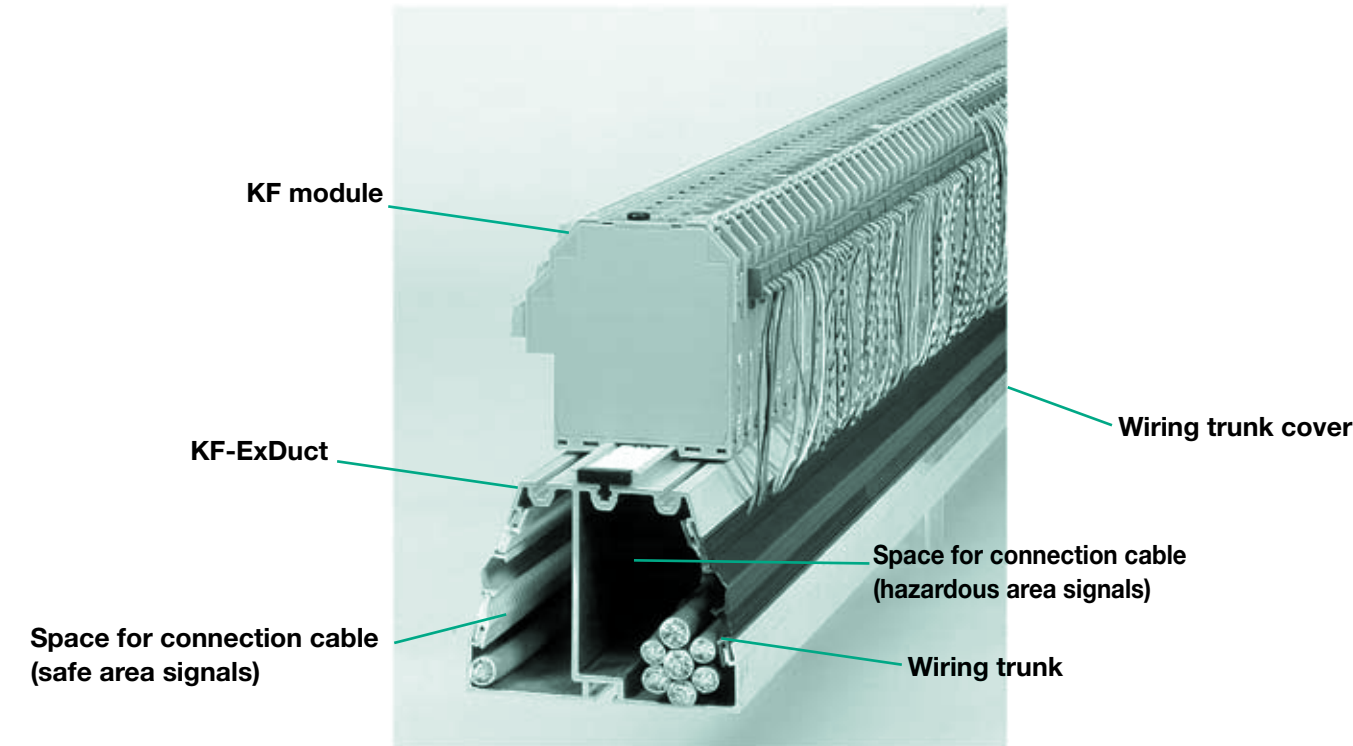
1. Very tight packing density in control cabinet assemblies because the wire duct is integrated into the mounting profile.
2. By using preconfigured system cables, an extremely short commissioning/start-up time is possible.
3. The prefabricated cables are equipped with the appropriate system connector. Thus, the number of connectors from the interface module to the control system is reduced to a minimum.

Optional Label Holder

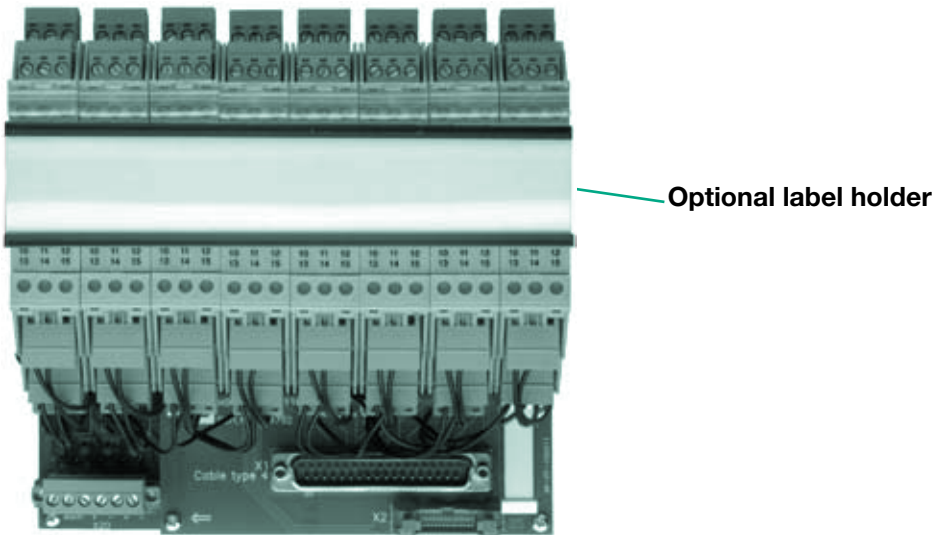
(KFD0-LC-0.5, KFD0-LC-1)

In addition to the integrated documentation holder on the module, Pepperl+Fuchs offers additional labeling for the KF-modules in the control cabinet. The labeling strips are available in 0.5 m or 1.0 m lengths. A labeling surface area of 20 x 30 mm is available per KF-module. See "Accessories" for more information.

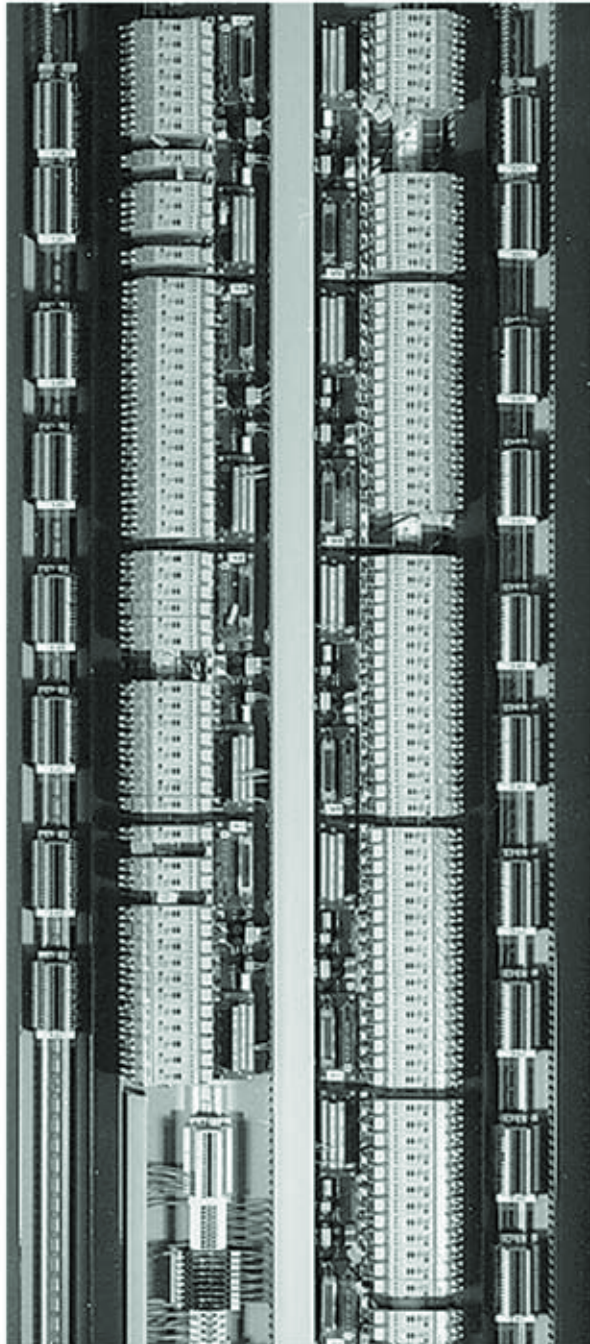
Pepperl+Fuchs KF ExDuct



Optional label holder



Switch cabinet layout



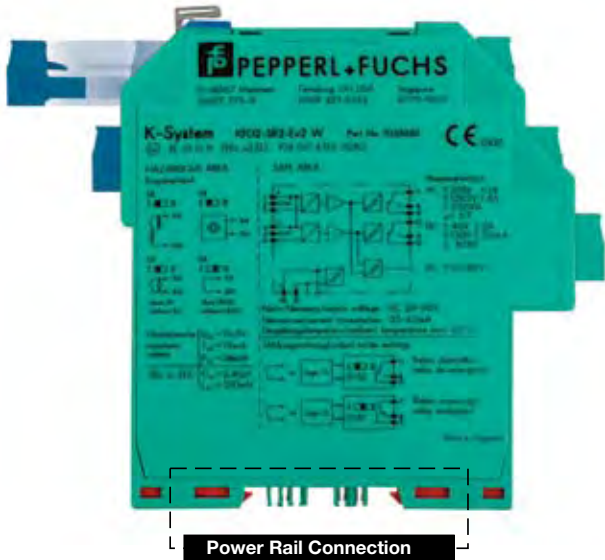
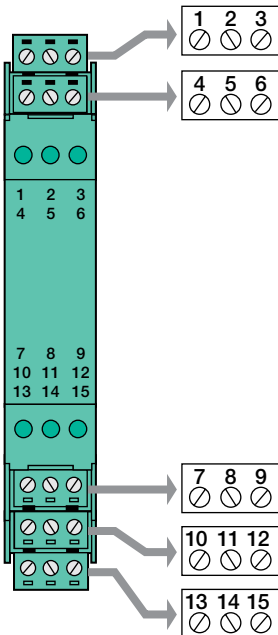
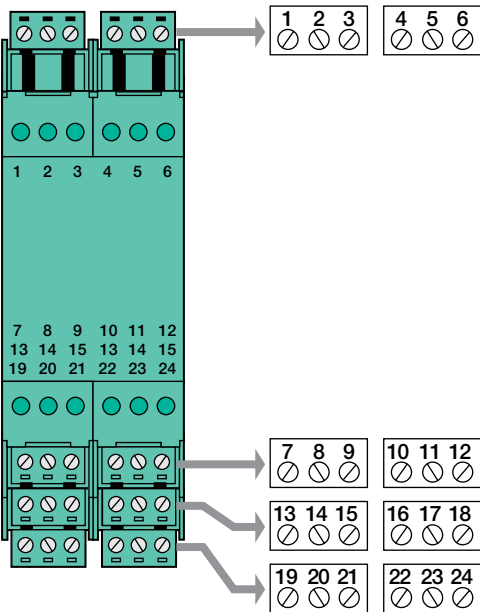
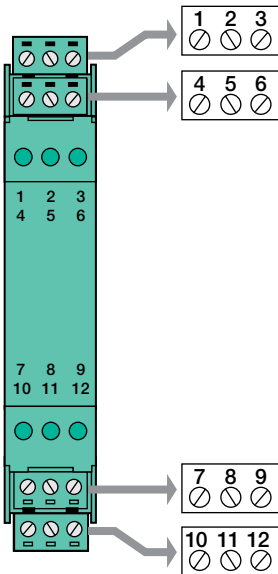
Control cabinet with marshalling



Control cabinet without marshalling

Terminal Designation

Please reference appropriate model for terminal designation.



Submersible Liquid Level Transmitter Model LS-10, LH-10

WIKA Datasheet LS_LH-10



Applications

- Level measurement in water and wastewater treatment plants, wells, holding tanks, wet wells, rivers

Special Features

- Ranges from 50INWC to 400PSI
- Rated IP 68 for permanent submersion
- Hastelloy case available for aggressive media
- 4-20 mA 2-wire output signal, others available
- Lightning protection available
- Cable supports over 220 pounds of strain

Description

The LS-10 liquid level transmitter is designed for economical and reliable performance in a wide variety of level measurement applications. The LS-10 provides a signal output of 4-20mA and an accuracy of 0.25% of span. Standard stocked pressure ranges are assembled with any length cable for fast delivery.

The high performance Model LH-10 provides 0.125% accuracy and is available with many custom features for special requirements. LH-10 options include lightning protection, temperature measurement, special output signals, plus FEP cable and Hastelloy construction for aggressive media.

The LH-10 is available with a low power 0.5-2.5V output signal and 5VDC supply voltage. This is ideal for solar or battery powered installations.

The LH-10 includes a dual cable entry design that prevents ingress of moisture into the electronics even if the cable is damaged. Both models feature watertight vented cable that can withstand over 220 pounds of strain. This allows the transmitter to be supported without any additional cabling.

Compensation for atmospheric pressure changes is accomplished through a vent tube in the cable. Many accessories, including cable clamps, desiccant drying cartridges, additional weights, and junction boxes are available for specific installation requirements. Both models can be equipped with the LevelGuard™ attachment for protection in difficult environments.



Left: LS-10 level transmitter
Center: LH-10 high performance level transmitter
Right: LH-10 with optional Hastelloy case and FEP cable



Optional WIKA LevelGuard™ Anti-clog attachment for submersible level transmitters. For use in lift stations, wet wells and other difficult level applications. For more information request bulletin LG-1.

Specifications

Model LS-10 / LH-10

Pressure ranges

LS-10 or LH-10 pressure ranges	100INWC	150INWC	250INWC	400INWC	5PSI	10PSI	15PSI	25PSI	30PSI	50PSI	100PSI
Maximum pressure*	30PSI	30PSI	60PSI	72PSI	30PSI	60PSI	72PSI	145PSI	145PSI	240PSI	500PSI
Burst pressure**	35PSI	35PSI	70PSI	87PSI	35PSI	70PSI	87PSI	170PSI	170PSI	290PSI	600PSI
LH-10 pressure ranges ¹⁾	50INWC	160PSI	200PSI	250PSI	300PSI	400PSI					
Maximum pressure*	14PSI	1160PSI	1160PSI	1160PSI	1160PSI	1160PSI					
Burst pressure**	29PSI	1390PSI	1390PSI	1390PSI	1390PSI	1390PSI					

¹⁾ Maximum range for LH-10 with FEP cable is 100PSI

		Model LS-10	Model LH-10
Materials			
■ Body		Stainless steel	Stainless steel {Hastelloy}
■ Pressure connection and diaphragm		Stainless steel	Stainless steel {Hastelloy}
■ Protective cap		PA	PA {Stainless steel} {Hastelloy}
■ Cable		PUR (polyurethane)	PUR {FEP, to 100 PSI maximum}
Power supply U _B	DC V	10 < U _B ≤ 30	10 < U _B ≤ 30 (14 ... 30 with 0 ... 10 V output signal) (5 ... 30 for battery powered operation, output signal 0.5 ... 2.5 V) ²⁾
Output signal		4 ... 20 mA, 2-wire	4 ... 20 mA, 2-wire 0 ... 20 mA, 3-wire {0 ... 5 V, 3-wire} {0 ... 10 V, 3-wire} {0.5 ... 2.5 V, 3-wire for battery powered operation} ³⁾ {Pt 100, 4-wire; IEC 60751} {Other signal outputs on request}
		²⁾ Power supply 5 ... 10 VDC with optional lightning protection	
		³⁾ Available with pressure ranges ≥ 0 100INWC	
Pt 100 RTD temperature sensor			
■ I max	mA	Not available	3
■ I mess	mA	Not available	1
Maximum load R _A		R _A < (U _B - 10V) / 0.02A – (0.043 Ohm x cable length in feet) (R _A in Ohms and U _B in VDC)	
■ Current output signal		-	R _A > 100 kOhm
■ Voltage output signal			
Response time (10 ... 90 %)	ms	≤ 1	≤ 1
Isolation voltage	DC V	500 ⁴⁾	500 ⁴⁾
		⁴⁾ NEC Class 02 power supply (low voltage and low current max. 100 VA even in fault conditions)	
Accuracy ⁵⁾	% of span	≤ 0.25 (BFSL)	≤ 0.125 ⁶⁾ (BFSL)
	% of span	≤ 0.5 (limit point calibration)	≤ 0.25 ⁶⁾ (limit point calibration)
		⁵⁾ Including linearity, hysteresis and repeatability. Limit point calibration method performed in vertical mounting position with pressure connection facing down.	
		⁶⁾ For pressure ranges < 0 ... 100INWC accuracy ≤ 0.25% of span (BFSL) ≤ 0.5% of span (limit point calibration)	
Non-repeatability	% of span	≤ 0.05	≤ 0.05
1-year stability	% of span	≤ 0.2 (at reference conditions)	≤ 0.2 (at reference conditions)
Permissible temperature of			
■ Medium ⁷⁾		+14 ... +122 °F -10 ... +50 °C	+14 ... +122 °F -10 ... +50 °C {+14 ... +185 °F (-10 ... +85 °C) with FEP-cable option}
■ Storage ⁷⁾		-22 ... +176 °F -30 ... +80 °C	-22 ... +176 °F -30 ... +80 °C
		⁷⁾ Also complies with EN 50178, Tab. 7, Type C, Class 4KH Operation, 1K4 Storage, 1K3 Transport	
Compensated temperature range		0 ... +50 °C +32 ... +122 °F	0 ... +50 °C +32 ... +122 °F
Temperature coefficients (TC) within compensated temperature range:			
■ Mean TC of zero	% of span	≤ 0.2 / 10 K (< 0.4 for 0.50 INWC)	
■ Mean TC of range	% of span	≤ 0.2 / 10 K	

Specifications

Model LS-10 / LH-10

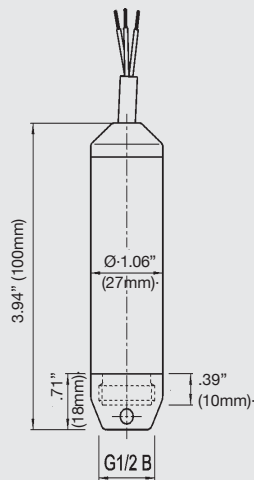
CE-conformity		89/336/EWG interference emission and immunity see EN 61 326
		Interference emission limit class A and B
Wiring protection		Protected against reverse polarity, overvoltage and short circuiting on the instrument side
		{Lightning protection EN 61000-4-5; 1,2J}
Weight		
■ Level Transmitter	lb	Approx. 0.4
■ Cable	oz per foot	Approx. 1.0
■ Additional weight	lb	Approx. 1.1

Items in curved brackets { } are optional extras for additional price.

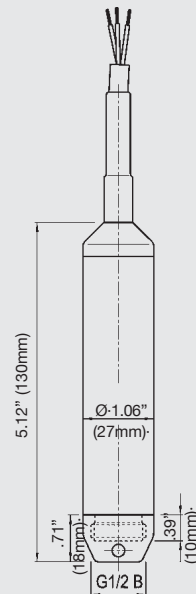
Dimensions in inches (mm)

Ingress Protection NEMA 6P (IP 68 per IEC 60 529)

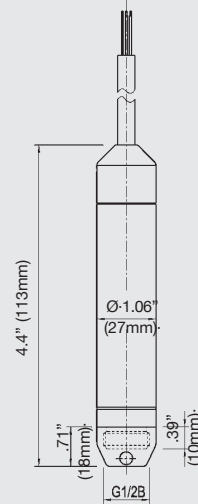
LS -10
(Immersion depth
up to 325 ft /100 m)



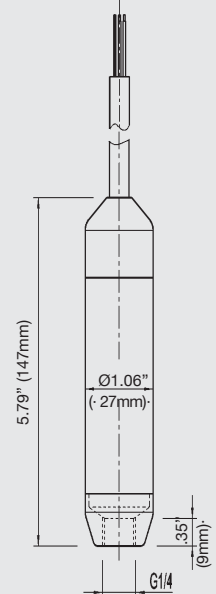
LH-10 with PUR-cable
(Immersion depth
up to 1000 ft / 300 m)



LH-10 with
FEP-cable *)
(Immersion depth
up to 325 ft / 100 m)



LH-10 with FEP-cable *)
(Immersion depth up to 325 ft /
100 m) {Hastelloy}



No additional support is required for installation as the cable can withstand over 220 lbs of strain (110 lbs for FEP cable)

*) FEP-cable and lightning protection EN 61000-4-5; 1,2J on request

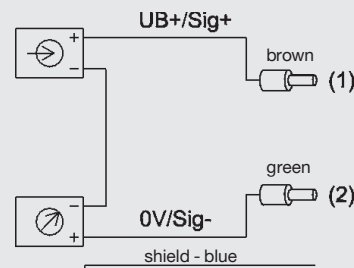
100 mm = 3.937 inches

Wiring

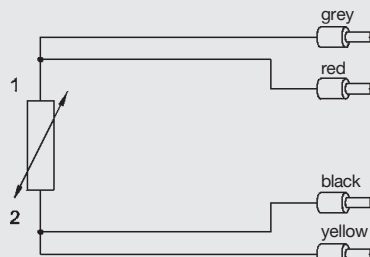
Vented PUR-cable
tensile strength 220 Lbs
(110 LBS with FEP-cable)

Pt 100 RTD temperature
sensor

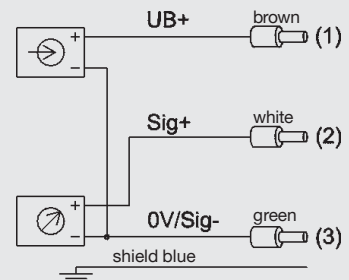
2-wire



4-wire



3-wire

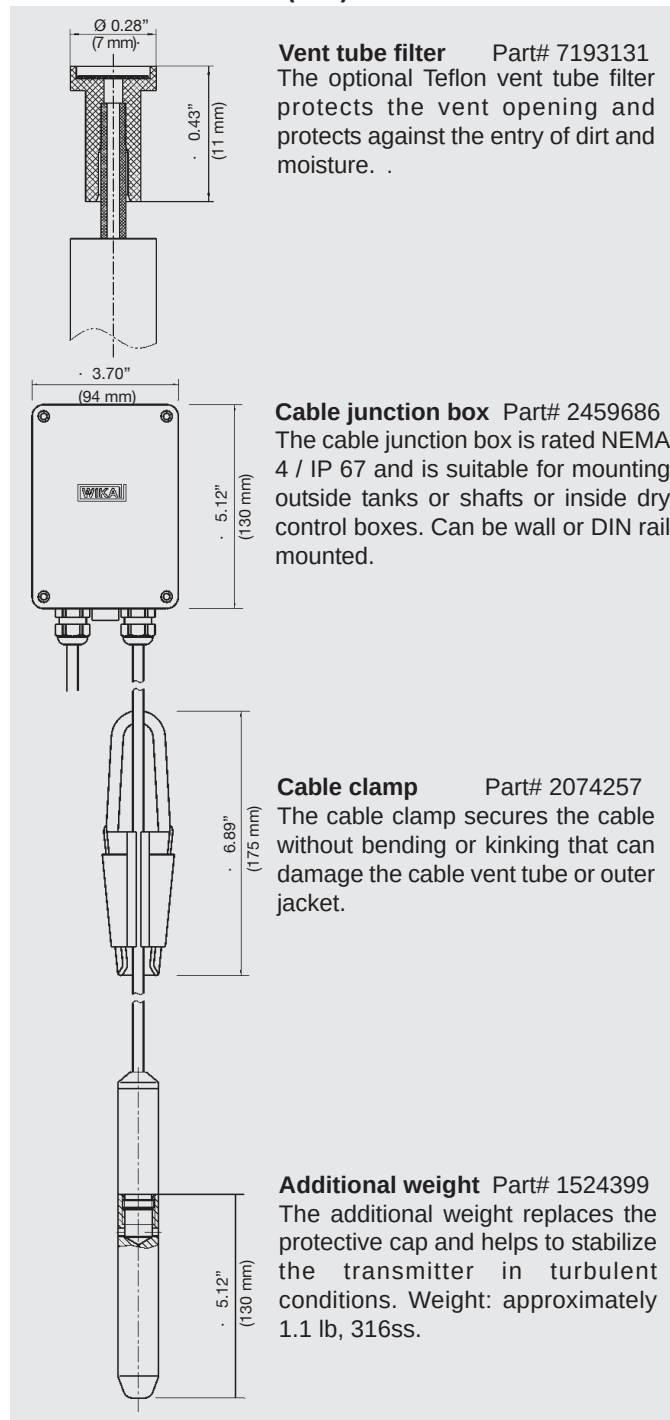


Legend:

	power supply	Sig+ output signal positive
	UB+ power supply positive	
	0V power supply negative	
	Sig- output signal negative	

Accessories

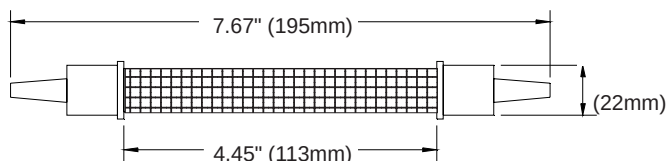
Dimensions in inches (mm)



Desiccant drying cartridge

part # 9836700

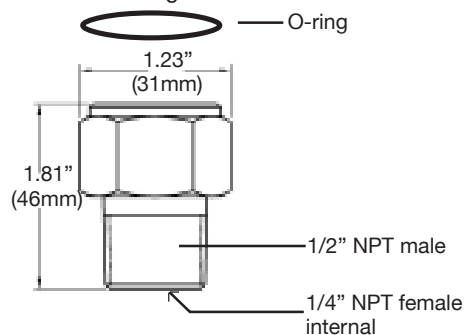
The desiccant drying cartridge helps prevent moisture buildup inside the vent tube.



NPT adapter

Part# 1631322

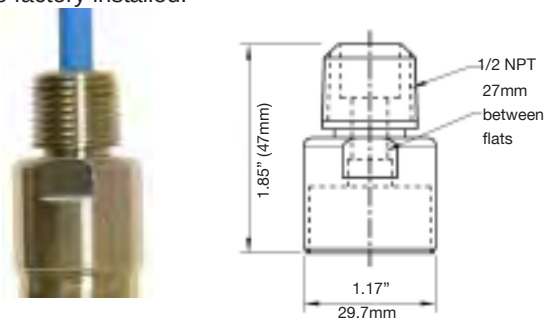
The 316 ss G1/2 adapter replaces the removable protective cap and converts the threads to 1/2" NPT male external, 1/4" female internal threads. Includes O-ring.



Conduit adapter

Part# 2289718

316 ss 1/2" NPT male cable conduit adapter. Must be factory installed.



LevelGuard™ Anti-clog attachment

Part # 50077091



The stainless steel LevelGuard™ attachment must be factory installed and calibrated.

Specifications and dimensions given in this data sheet represent the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.



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MODEL LP3

**INSTALLATION AND SERVICE INSTRUCTIONS FOR STREAMLINE™
LP3 STROBE LIGHTS**

MODELO LP3

**INSTRUCCIONES DE INSTALACION Y MANTENIMIENTO PARA LUCES
ESTROBOSCOPICAS LP3 STREAMLINE™**

MODELE LP3

**INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN POUR LES
LAMPES STROBOSCOPIQUES LP3 STREAMLINE™**

Address all communications and shipments to:
Dirija todos la correspondencia y envíos a:
Adressez toutes les communications et expéditions à:



FEDERAL SIGNAL CORPORATION
Electrical Products Division
2645 Federal Signal Drive
University Park, IL 60466-3195

INSTALLATION AND SERVICE INSTRUCTIONS FOR STREAMLINE™ LP3 STROBE LIGHTS

SAFETY MESSAGE TO INSTALLERS, USERS, AND MAINTENANCE PERSONNEL

It is important to follow all instructions shipped with this product. This device is to be installed by a trained electrician who is thoroughly familiar with the National Electric Code and will follow the NEC Guidelines as well as local codes.

The selection of mounting location for the device, its controls and the routing of the wiring is to be accomplished under the direction of the facilities engineer and the safety engineer. In addition, listed below are some other important safety instructions and precautions you should follow:

- Read and understand all instructions before installing or operating this equipment.
- Disconnect light from the power supply before any installation or maintenance is performed.
- After installation, test the light system to ensure that it is operating properly.
- After testing is complete, provide a copy of this instruction sheet to all operating personnel.
- Establish a procedure to routinely check the light installation for integrity and proper operation.
- The nameplate, which may contain cautionary or other information of importance to maintenance personnel, should NOT be obscured in any way.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

I. INSTALLATION.

A. Mounting.

1. Pipe Mounting (LP3P).

The Model LP3P strobe light may be installed on 1/2" NPT pipe. If 3/4" NPT pipe is used, a user-supplied reducer and pipe nipple are required.

- a. Attach light to pipe by turning clockwise. Use tool against wrench flats on conduit hub for final tightening.
- b. Refer to section C for information on making electrical connections.

2. Surface Mounting.

Model LP3S and LP3T strobe lights may be surface mounted directly. When surface mounted using Model LP3S, wiring may be run through a hole in bottom of housing or through a notch in bottom recess of housing. NOTE: Wiring should NOT be run through notch in housing if unit operates on AC voltage.

a. Surface Mounting using LP3S.

1. Remove lens from housing by turning counter-clockwise.
2. Remove the printed circuit board assembly by depressing the two snap tabs inside the housing and lifting the board assembly upwards.
3. Using the rubber gasket as a template, or the dimensions shown in figure 3, mark three mounting holes and center wiring hole. Drill or punch out holes as necessary.
4. If wiring is to be run through notch in bottom recess of housing, remove 0.28" (7.1mm) diameter knockout in bottom of housing and remove tab from rubber gasket.
 - a. Feed supply wires (14 to 18 AWG only) through 0.28" (7.1mm) diameter knockout and leave enough wire inside housing to make connections to terminal block located on top side of printed circuit board assembly.

5. Locate thick rubber gasket on mounting surface and set housing on top of gasket. Secure to mounting surface using the appropriate user supplied #6 (3.5mm) screws.
6. Refer to section C for information on making electrical connections.

b. Surface Mounting using LP3T.

1. Using gasket as a template, or the dimensions shown in figure 3, mark two mounting holes and center wiring hole (if wiring is to enter through bottom of unit). Drill or punch out holes as necessary.
2. Locate rubber gasket on mounting surface and set housing on top of gasket. Secure to mounting surface using the appropriate user supplied # 10 (5 mm) screws.
3. Refer to section C for information on making electrical connections.

B. Specifications.

Operating Voltage	12-48VDC	120VAC 50/60 Hz	230-240VAC 50/60 Hz
Operating Current	.44 - .10A	.10A	.07A
Energy Output	2.0 Joules	2.0 Joules	2.0 Joules
Flash Rate	65-95 FPM	65-95 FPM	65-95 FPM
Operating Temperature	-31°F to 150°F (-35°C to 66°C)		
Approvals	UL, cUL (excluding LP3T 12-48VDC)		
Additional Approvals	CE (excluding LP3E, LP3T, and all 120/240VAC models)		
Environmental Ratings	Indoor/Outdoor Use, Type 4X, IP66 (LP3T, IP55)		

C. Electrical Connections.

The Model LP3 comes assembled from the factory. Two 9" long lead wires are supplied on the 12-48 volt DC model of LP3T. All other models are supplied with a two position terminal block for making wiring connections.

1. Terminal Block Wiring.

If the strobe light has not been disassembled previously for mounting, perform the following steps:

- a. Remove lens from housing by turning counter-clockwise.
- b. Remove printed circuit board assembly by depressing the two snap tabs inside the housing and lift the board assembly upwards.
- c. If supply wires were not previously drawn into housing previously, feed supply wires (14 to 18 AWG only) through large hole in bottom of housing.
- d. Strip a maximum of 0.25" (6.4mm) of wire insulation from the ends of the power leads. Connect wires to terminal block by inserting the stripped ends of the wire into connector as far as they can travel and tightening clamping screw.

NOTE

Be sure to observe polarity on the 12-48 VDC printed circuit board assembly. The terminals are designated by a "+" and "-" on the terminal block for the positive and negative supply leads, respectively.

The maximum tightening torque is 5 in-lbs (.056 N-m) for field wiring connections on the terminal block. Make sure power supply lead insulation is flush with connector. If stranded wire is used, be sure that there are no loose strands outside the connector that could touch the adjacent lead to cause a short circuit.

- e. To reassemble, snap printed circuit board assembly into housing making sure that the board rests on its' mounting platforms. Take care not to pinch supply wires when inserting board. See figure 2 for recommended wire routing.
- f. Thread lens onto housing by turning clockwise until lens is fully seated.
- g. Install supplied locking screw on lens to secure.
- h. Energize the supply circuit and test strobe light for proper operation.

2. Lead Wiring.

- a. Connect the red (+) lead to the positive power source terminal and black (-) lead to the negative power source terminal.
- b. Energize the supply circuit and test strobe light for proper operation.

II. STROBE TUBE REPLACEMENT.

After extended operation, occasionally check for flash tube degradation. Should the flash tube misfire, have a noticeable decrease in light output, glow continuously or darken- replacement is necessary.

WARNING

HIGH VOLTAGES ARE PRESENT INSIDE THE LIGHT ASSEMBLY. WAIT AT LEAST 5 MINUTES AFTER SHUTTING OFF THE POWER BEFORE SERVICING THIS UNIT.

To replace strobe tube, proceed as follows:

- A. Disconnect power from the supply circuit and wait five minutes before opening unit to allow all capacitors to fully discharge.
- B. Loosen locking screw on lens and remove lens from housing by turning counter-clockwise.
- C. Carefully remove old strobe tube by grasping connector and lifting upwards.
- D. See replacement parts table in section IV. for a complete list of Federal Signal lamps that are available. Install new strobe tube by fully seating it into receptacle on the printed circuit board.
- E. Attach lens to housing by turning clockwise until it is fully seated.
- F. Tighten locking screw on lens to secure.

III. SERVICE.

The Federal factory will service your equipment or provide technical assistance with any problems that cannot be handled locally.

Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization. This R.M.A. can be obtained from a local Distributor or Manufacturer's Representative.

At this time a brief explanation of the service requested, or the nature of the malfunction, should be provided.

Address all communications and shipments to:

FEDERAL SIGNAL CORPORATION
Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60466-3195

IV. REPLACEMENT PARTS.

<u>Description</u>	<u>Part Number.</u>
Strobe tube	K149130A
Lens, Amber	K8589006A
Lens, Blue	K8589006A-01
Lens, Clear	K8589006A-02
Lens, Green	K8589006A-03
Lens, Red	K8589006A-04
Gasket, LP3S	K8589011A
Gasket, LP3T	K8589012A
Gasket, Lens	K8589013A
Printed circuit board assy, 120VAC	K2001317A
Printed circuit board assy, 240VAC	K2001317A-01
Printed circuit board assy, 12-48VDC	K2001316B

INSTRUCCIONES DE INSTALACION Y MANTENIMIENTO PARA LUCES ESTROBOSCOPICAS LP3 STREAMLINE™

MENSAJE DE SEGURIDAD PARA INSTALADORES, USUARIOS Y PERSONAL

DE MANTENIMIENTO

Es importante seguir todas las instrucciones enviadas con este producto. Este dispositivo debe ser instalado por un electricista que esté totalmente familiarizado con el Código de electricidad nacional y que cumplirá las pautas NEC así como también los códigos locales.

La elección del sitio para el montaje del dispositivo, sus controles y la ruta del cableado debe lograrse bajo la dirección del ingeniero de instalaciones y el ingeniero de seguridad. Además, debajo están listadas otras importantes instrucciones y precauciones acerca de la seguridad que usted debe obedecer:

- Lea y entienda todas las instrucciones antes de instalar o de operar este equipo.
- Desconecte la luz de la salida de corriente antes de realizar cualquier instalación o mantenimiento.
- Después de la instalación, pruebe el sistema de luz para asegurarse que está funcionando adecuadamente.
- Después de completar la prueba, proporcione una copia de esta hoja de instrucciones a todo el personal operativo.
- Establezca un procedimiento para revisar rutinariamente la instalación de las luces para verificar su integridad y un funcionamiento adecuado.
- La placa con el nombre, que puede contener información de advertencia o de otro tipo que sea importante para el personal de mantenimiento NO debe ser ocultada en forma alguna.

El no cumplimiento con todas las precauciones e instrucciones puede dar como resultado daño a la propiedad, lesiones graves, o la muerte.

I. INSTALACION.

A. Montaje.

1. Montaje Sobre Tubo (LP3P).

La luz estroboscópica modelo LP3P puede instalarse en un tubo 1/2" NPT. Si se usa un tubo 3/4" NPT, se requiere que el usuario proporcione un reductor y un niple para el tubo.

- a. Adjunte la luz al tubo girándola en sentido horario. Use una herramienta contra el plano para llave de tuerca sobre el borne conductor para un ajuste final.
- b. Refiérase a la sección C para obtener información sobre cómo hacer las conexiones eléctricas.

2. Montaje Sobre Superficie.

Las luces estroboscópicas Modelo LP3S y LP3T pueden montarse directamente sobre la superficie. Cuando se montan usando el Modelo LP3S, el cableado se puede pasar a través de un orificio en el fondo de la caja o a través de una muesca en la cavidad del fondo de la caja. AVISO: El cableado NO debe pasarse a través de la muesca en la caja si la unidad funciona con voltaje de CA.

a. Montaje Sobre Superficie usando LP3S.

1. Quite el lente de la caja girando en sentido antihorario.
2. Quite el ensamblaje de la placa de circuito impreso presionando hacia abajo las dos lengüetas sujetadoras que se encuentran dentro de la caja y levantando el ensamblaje de la placa hacia arriba.

3. Usando la junta de goma como molde, o las dimensiones que se muestran en la figura 3, marque tres orificios de montaje y un orificio central para el cableado. Taladre o perfore los orificios en la forma en que sea necesario.
4. Si el cableado se llevará a través de una muesca en la cavidad del fondo de la caja, quite el diámetro troquelado de 0.28" (7.1mm) en el fondo de la caja y quite la lengüeta de la junta de goma.
 - a. Alimente los cables de suministro (14 a 18 AWG solamente) a través del diámetro troquelado de 0.28" (7.1mm) y deje suficiente cable dentro de la caja para hacer las conexiones al bloque terminal ubicado en la parte superior del montaje de la placa de circuito impreso.
5. Ubique una junta de goma gruesa en la superficie de montaje y coloque la caja encima de la junta. Asegure la superficie de montaje usando los tornillos adecuados #6 (3.5mm) proporcionados por el usuario.
6. Refiérase a la sección C para información sobre cómo hacer las conexiones eléctricas.

b. Montaje Sobre Superficie usando LP3T.

1. Usando la junta de goma como molde, o las dimensiones que se muestran en la figura 3, marque dos orificios de montaje y un orificio central para el cableado (si el cableado va a entrar a través del fondo de la unidad). Taladre o perfore los orificios en la forma en que sea necesario.
2. Ubique una junta de goma en la superficie de montaje y coloque la caja encima de la junta. Asegure la superficie de montaje usando los tornillos adecuados #10 (5mm) proporcionados por el usuario.
3. Refiérase a la sección C para información sobre cómo hacer las conexiones eléctricas.

B. Especificaciones.

Voltaje operativo	12-48VCC	120VCA 50/60Hz	230-240VCA 50/60Hz
Corriente operativa	0,44 - .10A	0,10A	0,07A
Salida de energía	2,0 Joules	2,0 Joules	2,0 Joules
Frecuencia de flash	65-95 FPM	65-95 FPM	65-95 FPM
Temperatura operativa	-31°F a 150°F (-35°C a 66°C)		
Aprobado por	UL, cUL (excluyendo LP3T 12-48VDC)		
Aprobaciones adicionales	CE (excluyendo LP3E, LP3T y todos los modelos de 120/240 VCA)		

Clasificación medioambiental Uso en interiores/exteriores, Tipo 4X, IP66 (LP3T, IP55)

C. Conexiones Eléctricas.

El Modelo LP3 viene armado de fábrica. En el modelo 12-48 voltios CA de LP3T se proporcionan dos cables guía de 9" de largo. Todos los demás modelos se proporcionan con un bloque terminal de dos posiciones para hacer las conexiones del cableado.

1. Cableado del Bloque Terminal.

Si la luz estroboscópica no ha sido desarmada previamente para su montaje, siga los siguientes pasos:

- a. Quite los lentes de la caja girando en sentido antihorario.
- b. Quite el ensamblaje de la placa de circuito impreso presionando hacia abajo las dos lengüetas sujetadoras que se encuentran dentro de la caja y levantando el ensamblaje de la placa hacia arriba.

- c. Si los cables de suministro no fueron tirados hacia adentro de la caja previamente, alimente los cables de suministro (14 a 18 AWG solamente) a través del orificio mayor en el fondo de la caja.
- d. Pele un máximo de 0.25" (6.4mm) del aislamiento del cable de las puntas del conector de alimentación. Conecte los cables al bloque terminal insertando las puntas peladas del cable dentro del conector lo más profundo que sea posible y apriete el tornillo prensil.

NOTA

Asegúrese de observar la polaridad en el conjunto del tablero del circuito impreso de 12-48 VCC. Los terminales están marcados por "+" y "-" en el bloque de terminales para los conductores de alimentación positivo y negativo, respectivamente.

La torsión de ajuste máxima es de 5 pulgadas por libra (0,056 N-m) para las conexiones del cableado de campo en el bloque terminal. Asegúrese que el aislamiento del conector de alimentación de energía se encuentre parejo con el conector. Si se usa cable de hilos, asegúrese que no queden hilos sueltos fuera del conector que puedan tocar el conector adyacente y causar un cortocircuito.

- e. Para volver a ensamblar, presione el ensamblaje de la placa de circuito impreso hasta que calce en su lugar dentro de la caja asegurándose que la placa quede colocada en sus plataformas de montaje. Tenga cuidado de no pellizcar los cables de suministro cuando inserte la placa. Consulte la figura 2 para el recorrido recomendado del cableado.
- f. Enrosque los lentes a la caja girando en sentido horario hasta que el lente calce totalmente.
- g. Instale sobre el lente, los tornillos de fijación que se proporcionan, para asegurarlo.
- h. Proporcione energía al circuito de suministro y pruebe la luz estroboscópica para verificar que funciona correctamente.

2. Cableado Principal.

- a. Conecte el conector rojo (+) a la terminal de la fuente de energía positiva y el conector negro (-) a la terminal de la fuente de energía negativa.
- b. Inicie la corriente de energía en el circuito de suministro y pruebe la luz estroboscópica para verificar un funcionamiento adecuado.

II. REEMPLAZO DEL TUBO ESTROBOSCOPICO.

Luego de un funcionamiento prolongado, ocasionalmente verifique la degradación del tubo de flash. Si el tubo de flash se dispara erróneamente, tiene una disminución notable en la salida de luz, brilla continuamente o se oscurece, es necesario reemplazarlo.

ADVERTENCIA

EXISTEN VOLTAJES ALTOS DENTRO DEL ENSAMBLAJE DE LA LUZ. ESPERE AL MENOS 5 MINUTOS DESPUES DE CORTAR LA FUENTE DE ENERGIA PARA REALIZARLE EL MANTENIMIENTO A ESTA UNIDAD.

Para reemplazar el tubo estroboscópico, proceda de la siguiente forma:

- A. Desconecte la energía del circuito de suministro y espere cinco minutos antes de abrir la unidad para permitir que todos los capacitadores se descarguen completamente.
- B. Afloje los tornillos de fijación en el lente y quite el lente de la caja girando en sentido antihorario.
- C. Quite cuidadosamente el tubo estroboscópico viejo tomando el conector y levantando hacia arriba.

- D. Consulte la lista de partes de reposición en la sección IV para una lista completa de las lámparas de Federal Signal que están disponibles. Instale un nuevo tubo estroboscópico asentándolo totalmente en el receptáculo de la placa de circuito impreso.
- E. Adose el lente a la caja girándolo en sentido horario hasta que quede totalmente asentado.
- F. Apriete los tornillos de fijación en el lente para asegurarlo.

III. MANTENIMIENTO.

La fábrica Federal le realizará el mantenimiento de su equipo o le proporcionará asistencia técnica con cualquier problema que no pueda manejar en forma local.

Cualquier unidad que sea devuelta a Federal Signal para mantenimiento, inspección, o reparación debe estar acompañada de una Autorización de devolución de material (R.M.A.).

Esta R.M.A. se puede obtener del distribuidor local o del representante del fabricante.

En este momento, se deberá proporcionar una breve explicación del mantenimiento solicitado, o de la naturaleza del mal funcionamiento.

Dirija todas las comunicaciones y envíos a:

FEDERAL SIGNAL CORPORATION
Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60466-3195

III. PARTES PARA REEMPLAZO.

<u>Descripción</u>	<u>Parte No.</u>
Tubo estroboscópico	K149130A
Lente, Ambar	K8589006A
Lente, Azul	K8589006A-01
Lente, Incoloro	K8589006A-02
Lente, Verde	K8589006A-03
Lente, Rojo	K8589006A-04
Junta plana, LP3S	K8589011A
Junta plana, LP3T	K8589012A
Junta plana, Lente	K8589013A
Ensamblaje de placa de circuito impreso, 120VCA	K2001317A
Ensamblaje de placa de circuito impreso, 240VCA	K2001317A-01
Ensamblaje de placa de circuito impreso, 12-14VCC	K2001316B

INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN POUR LES LAMPES STROBOSCOPIQUES LP3 STREAMLINE™

MESSAGE DE SÉCURITÉ POUR LES INSTALLATEURS, LES UTILISATEURS ET LE PERSONNEL D'ENTRETIEN

Il est important de suivre toutes les instructions expédiées avec ce produit. Ce dispositif doit être installé par un électricien qualifié au fait des codes nationaux et locaux applicables dans le pays d'utilisation et qui saura les respecter.

Le choix d'un site d'installation du dispositif, son contrôle et l'acheminement du câblage doit s'effectuer sous la direction de l'ingénieur de l'installation et l'ingénieur de sécurité. En outre, vous trouverez ci-après d'autres instructions importantes de sécurité ainsi que des précautions à suivre:

- Lire et bien comprendre toutes les instructions avant d'installer ou de faire fonctionner l'équipement.
- Débrancher la lampe du courant avant toute installation ou entretien.
- Après l'installation, procéder à un test de la lampe pour s'assurer qu'elle fonctionne correctement.
- Après le test, fournir une copie de ce feuillet d'instructions à tout le personnel responsable des opérations.
- Établir une procédure pour vérifier de routine l'intégrité et le bon fonctionnement des lampes.
- La plaque signalétique, qui peut contenir des mises en garde ou autres renseignements importants pour le personnel responsable de l'entretien, NE doit jamais être obscurcie de quelque façon que ce soit.

Le non respect de ces précautions et instructions de sécurité peut mener à des dommages à la propriété, des blessures graves ou la mort, pour vous ou pour d'autres personnes.

I. INSTALLATION.

A. Monter.

1. Monter Sur Tuyau (LP3P).

La lampe stroboscopique de Modèle LP3P peut s'installer sur un tuyau de po NPT. Si vous utilisez un tuyau de po NPT, il faut vous procurer un mamelon de tuyau et un raccord réducteur.

- a. Fixez la lampe au tuyau en tournant dans le sens des aiguilles. Utilisez un outil contre les pans de manoeuvre des emboîtements pour resserrer une dernière fois.
- b. Reportez-vous à la section C pour plus d'information sur les connexions électriques.

2. Monter en Surface.

Les lampes stroboscopiques de Modèles LP3S et LP3T peuvent s'installer directement en surface. Lorsque vous montez en surface le Modèle LP3S, vous pouvez acheminer le fil dans un trou au bas du boîtier ou dans l'encoche au bas du creux du boîtier. **NOTA:** N'acheminez PAS les fils dans l'encoche du boîtier si l'appareil fonctionne sur tension c.a.

a. Montage en Surface en Utilisant le Modèle LP3S.

1. Retirez les lentilles du boîtier en tournant dans le sens contraire des aiguilles.
2. Retirez la plaquette de circuits imprimés en enfonceant les deux languettes encliquetables à l'intérieur du boîtier et soulevez la plaquette vers le haut.
3. Utilisez le joint en caoutchouc comme gabarit ou les dimensions indiquées sous la figure 3, marquez trois trous de montage et centrez le trou d'acheminement des fils. Percez ou enfoncez les trous au besoin.

4. Si les fils doivent être acheminés par l'encoche dans le creux du boîtier, retirez l'alvéole enfonçable d'un diamètre de 0,28 po (7,1mm) du bas du boîtier, puis retirez la languette du joint en caoutchouc.
- a. Acheminez les fils de courant (14 à 18 AWG seulement) dans l'alvéole enfonçable d'un diamètre de 0,28 po (7,1mm) tout en laissant suffisamment de fil à l'intérieur du boîtier pour effectuer la connexion au bloc de jonction qui se trouve sur le dessus de la plaquette de circuits imprimés.
5. Trouvez le joint en caoutchouc épais sur la surface de montage et placez le boîtier sur le joint. Fixez à la surface de montage avec les vis #6 (3,5mm) fournies par l'utilisateur.
6. Référez-vous à la section C pour plus d'information au sujet des connexions électriques.

b. Montage en Surface Utilisant le Modèle LP3T.

1. Utilisez le joint comme gabarit ou les dimensions indiquées sous la figure 3, marquez deux trous de montage et centrez le trou d'acheminement des fils (si les fils doivent entrer par le bas de l'appareil). Percez ou enfoncez les trous au besoin.
2. Trouvez le joint en caoutchouc sur la surface de montage et placez le boîtier sur le joint. Fixez à la surface de montage avec les vis #10 (5mm) fournies par l'utilisateur.
3. Référez-vous à la section C pour plus d'information au sujet des connexions électriques.

B. Spécifications.

Tension de fonctionnement	12-48VCC,	120VCA 50/60 Hz	230-240 VCA 50/60 Hz.
Courant de fonctionnement	0,44-0,10A	0,10A	0,07A
Sortie d'énergie	2,0 Joules	2,0 Joules	2,0 Joules
Rythme d'éclair	65-95 FPM	65-95 FPM	65-95 FPM
Température de fonctionnement	-31°F à 150°F (-35° à 66°C)		
Approbations	UL, cUL (excluant LP3T 12-48V CC)		
Approbations supplémentaires	CE (excluant LP3E, LP3T et tous les modèles 120/240V CA)		
Évaluation environnementale	Usage intérieur et extérieur, Type 4X, IP66 (LP3T, IP55)		

C. Connexions Électriques.

Le Modèle LP3 vous arrive assemblé en usine. Deux long fils de 9 po sont fournis avec le modèle CC. 12-48 volts de LP3T. Tous les autres modèles sont fournis avec un bloc de jonction à deux positions pour les connexions de fils.

1. Câblage du Bloc de Jonction.

Si la lampe stroboscopique n'a pas été démontée avant l'installation, procédez à ces étapes:

- a. Retirez les lentilles du boîtier en tournant dans le sens contraire des aiguilles.
- b. Retirez la plaquette de circuits imprimés en enfonçant les deux languettes encliquetables à l'intérieur du boîtier et soulevez la plaquette vers le haut.
- c. Si les fils d'alimentation n'étaient pas déjà entrés dans le boîtier, acheminez les fils (14 à 18 AWG seulement) par le gros trou au bas du boîtier.
- d. Dénudez au plus 0,25 po (6,4mm) d'isolant de fil des extrémités des fils d'alimentation. Connectez les fils au bloc de jonction en insérant les extrémités dénudées du fil dans le connecteur aussi loin que possible et en resserrant la vis de blocage.

NOTE

S'assurer d'observer la polarité à la connexion de cartes de circuit imprimé de 12-48 V CC. Les bornes sont identifiées par un "+" et un "-" sur le bloc de jonction pour les fils d'alimentation respectifs positif et négatif.

Le couple maximum de serrage est de 5 po-lb (0,056 N-m) pour les connexions sur le terrain dans un bloc de jonction. Assurez-vous que l'isolant du fil d'alimentation en courant est à niveau avec le connecteur. Si vous utilisez des fils multibrins, assurez-vous qu'il n'y a pas de brins dégagés à l'extérieur du connecteur qui pourraient toucher les fils adjacents et provoquer un court circuit.

- e. Pour remonter l'appareil, encliquetez la plaquette de circuits imprimés dans le boîtier en vous assurant que la plaquette repose sur les plates-formes de montage. Attention de ne pas pincer les fils d'alimentation en insérant la plaquette. Référez-vous à la figure 2 pour le parcours recommandé.
- f. Enfilez la lentille dans le boîtier en tournant dans le sens des aiguilles jusqu'à ce qu'elle soit bien installée.
- g. Installez la vis de blocage fournie sur la lentille pour la fixer en place.
- h. Mettez le circuit sous tension et essayez la lampe stroboscopique pour vous assurer de son bon fonctionnement.

2. Fils de Raccord.

- a. Connectez le fil rouge (+) à la borne positive et le noir (-) à la borne négative.
- b. Mettez le circuit sous tension et essayez la lampe stroboscopique pour vous assurer de son bon fonctionnement.

II. REMPLACEMENT DU TUBE STROBOSCOPIQUE.

Après une longue période de fonctionnement, vérifiez à l'occasion la dégradation du tube flash. S'il y a des ratés du tube, une diminution apparente de l'éclairage, une incandescence continue ou un noircissement, il faut remplacer le tube.

AVERTISSEMENT

IL Y A DE HAUTES TENSIONS À L'INTÉRIEUR DE LA LAMPE, ATTENDEZ AU MOINS 5 MINUTES APRÈS AVOIR COUPÉ LE COURANT AVANT D'EFFECTUER L'ENTRETIEN OU LES RÉPARATIONS À CET APPAREIL.

Pour remplacer le tube stroboscopique, faites les démarches suivantes:

- A. Coupez le courant à la source et attendez cinq minutes avant d'ouvrir l'unité pour permettre une pleine décharge de tous les condensateurs.
- B. Desserrez la vis de blocage de la lentille et retirez-la du boîtier en tournant dans le sens contraire des aiguilles.
- C. Retirez avec soin le vieux tube stroboscopique en agrippant le connecteur et en soulevant vers le haut.
- D. Consultez la table de pièces de rechange dans la section IV pour une liste complète des lampes Federal Signal disponibles. Installez le nouveau tube stroboscopique en l'installant complètement dans le réceptacle sur la plaquette de circuits imprimés.
- E. Fixez la lentille au boîtier en tournant dans le sens des aiguilles d'une montre jusqu'à ce qu'elle soit bien installée.
- F. Resserrez la vis de blocage sur la lentille pour la fixer en place.

III. ENTRETIEN.

Federal Signal procédera à l'entretien de votre équipement ou vous fournira de l'aide technique pour tout problème qui ne peut être résolu sur place.

Tous les appareils retournés à Federal Signal pour entretien, inspection ou réparation doivent être accompagnés d'une autorisation de retour du produit. Vous pouvez obtenir cette autorisation du distributeur local ou d'un représentant du fabricant.

Vous devez aussi fournir une brève explication du service requis ou de la nature du problème en retournant l'appareil.

Adresse pour les communications et les expéditions:

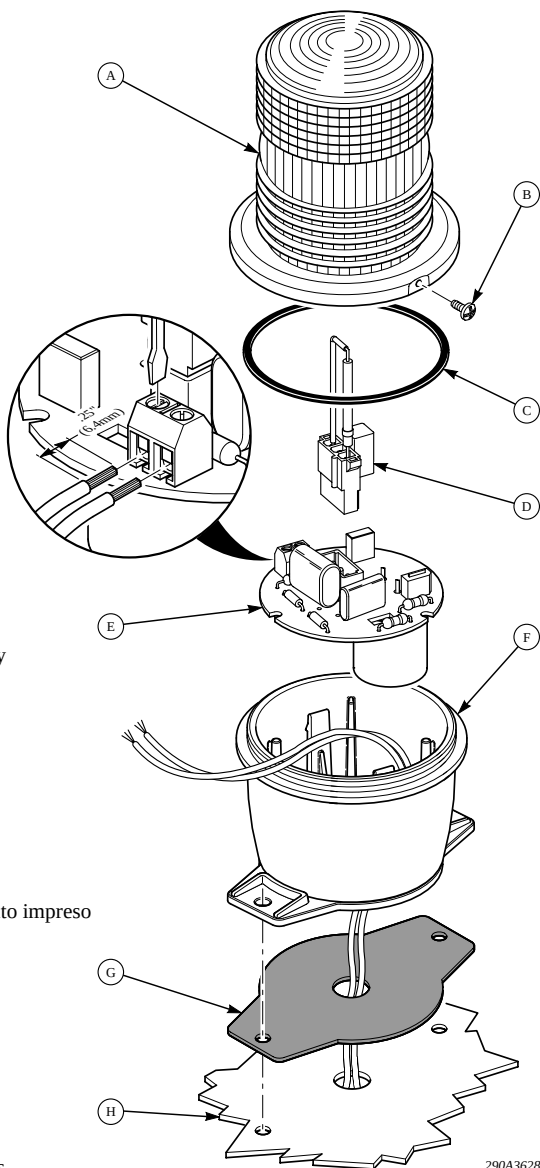
FEDERAL SIGNAL CORPORATION

Electrical Products Division
Service Department
2645 Federal Signal Drive
University Park, IL 60465-3195

IV. PIÈCES DE RECHANGE.

<u>Description</u>	<u>No pièce</u>
Tube stroboscopique	K149130A
Lentille ambrée	K8589006A
Lentille bleue	K8589006A-01
Lentille transparente	K8589006A-02
Lentille verte	K8589006A-03
Lentille rouge	K8589006A-04
Joint d'étanchéité, LP3S	K859001A
Joint d'étanchéité, LP3T	K8589012A
Joint d'Étanchéité, lentille	K8589013A
Plaquette de circuits imprimés, 120 V.c.a.	K2001317A
Plaquette de circuits imprimés, 240 V.c.a.	K2001317A-01
Plaquette de circuits imprimés, 12-48 V.c.c.	K2001316B

1



English

- A. Lens
- B. Screw
- C. Lens gasket
- D. Strobe tube
- E. Printed circuit board assembly
- F. Housing, LP3T
- G. Gasket, LP3T
- H. Mounting surface

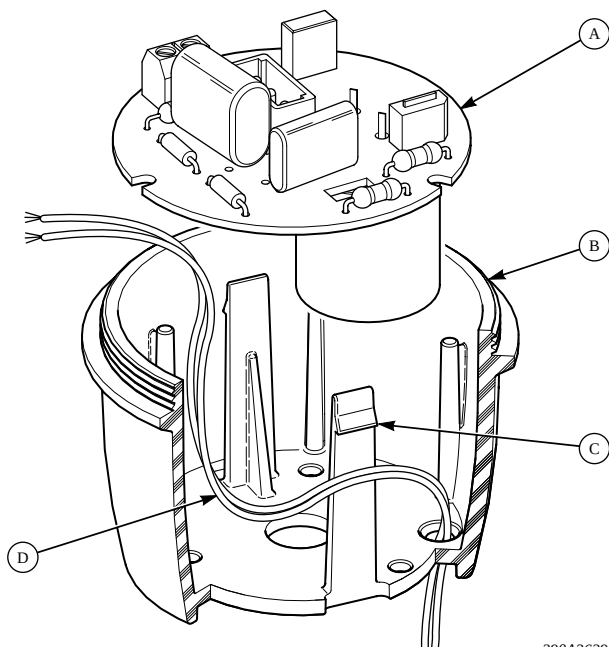
Español

- A. Lente
- B. Tornillo
- C. Empaquetadura de lente
- D. Tubo estroboscópico
- E. Ensamblaje de placa de circuito impreso
- F. Caja, LP3T
- G. Empaquetadura, LP3T
- H. Superficie de montaje

Français

- A. Lentille
- B. Vis
- C. Joint d'étanchéité de lentille
- D. Tube stroboscopique
- E. Plaque de circuits imprimés
- F. Boîtier, LP3T
- G. Joint d'étanchéité statique, LP3T
- H. Surface de montage

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290A3629

English

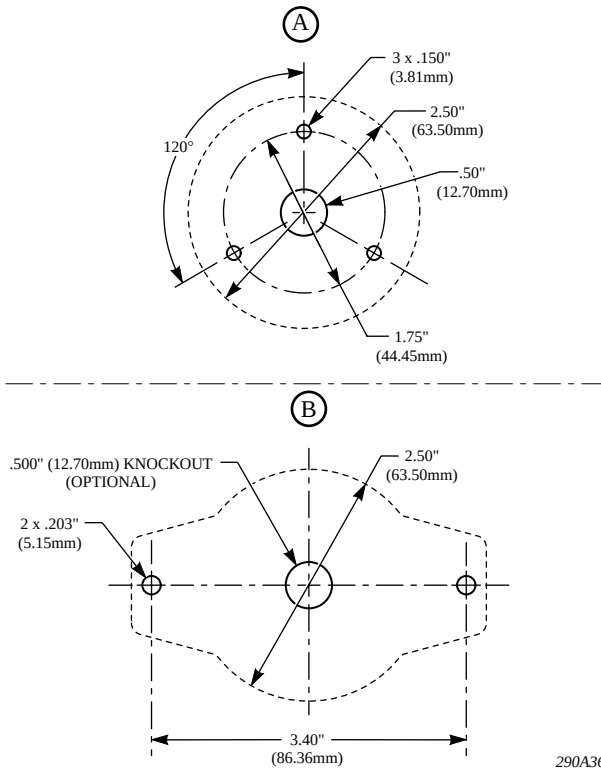
- A. Printed circuit board assembly
- B. Housing
- C. Snap tab
- D. Supply wire

Español

- A. Ensamblaje de placa de circuito impreso
- B. Caja
- C. Lengüeta a presión
- D. Cable de alimentación

Français

- A. Plaquette de circuits imprimés
- B. Boîtier
- C. Attache à mousqueton
- D. Fil fourni



290A3630

English

A. Surface mount, LP3S

B. Surface mount, LP3T

Español

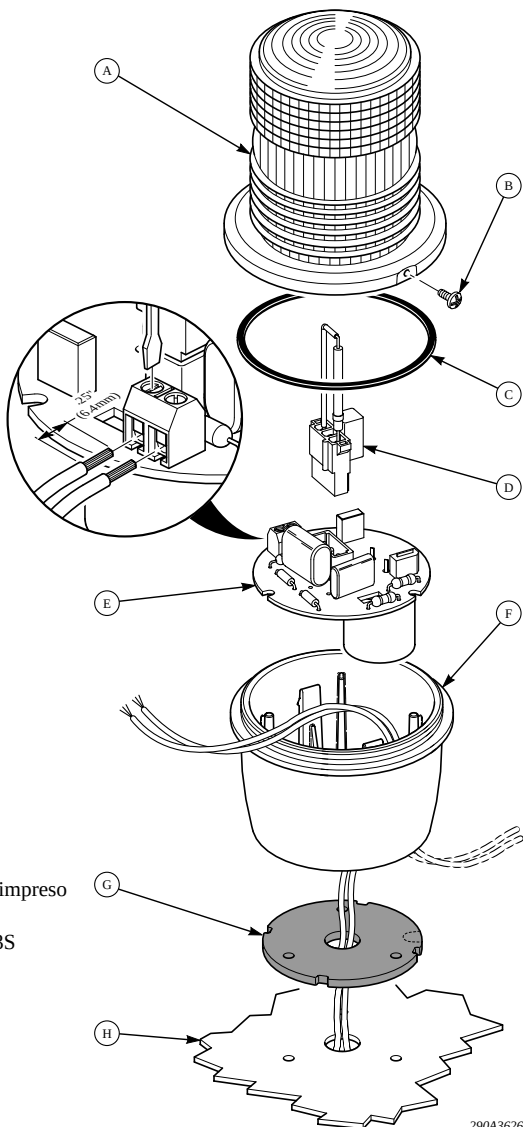
A. Montaje para superficie, LP3S

B. Montaje sobre superficie, LP3T

Français

A. Montage en surface, LP3S

B. Montage en surface, LP3T



English

- A. Lens
- B. Screw
- C. Lens gasket
- D. Strobe tube
- E. Printed circuit board assembly
- F. Housing, LP3S
- G. Gasket, LP3S
- H. Mounting surface

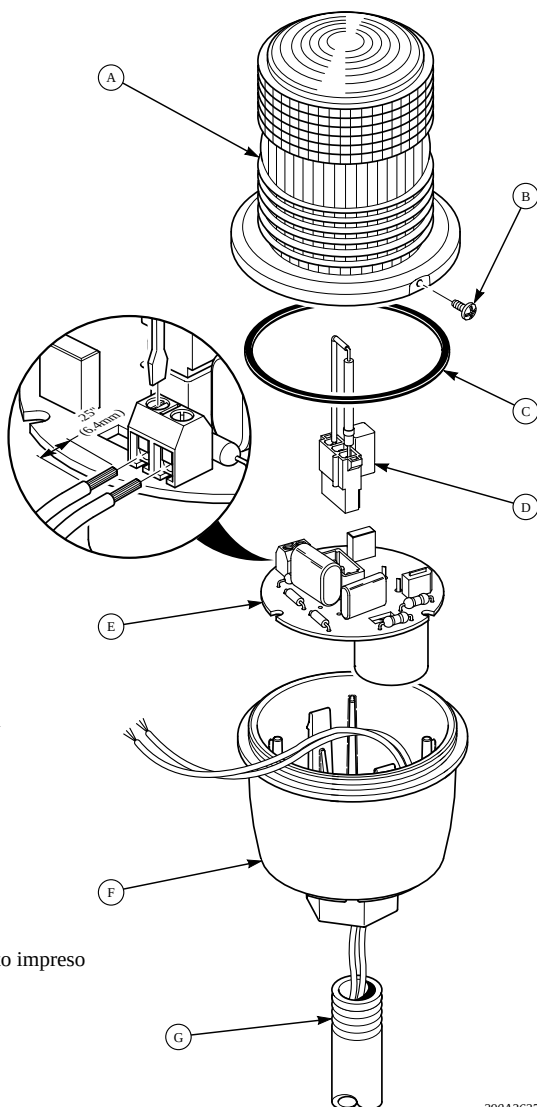
Español

- A. Lente
- B. Tornillo
- C. Empaquetadura de lente
- D. Tubo estroboscópico
- E. Ensamblaje de placa de circuito impreso
- F. Caja, LP3S
- G. Empaquetadura de montaje, LP3S
- H. Superficie de alimentación

Français

- A. Lentille
- B. Vis
- C. Joint d'étanchéité de lentille
- D. Tube stroboscopique
- E. Plaquette de circuits imprimés
- F. Boîtier, LP3S
- G. Joint d'étanchéité statique, LP3S
- H. Surface de montage

290A3626



English

- A. Lens
- B. Screw
- C. Lens gasket
- D. Strobe tube
- E. Printed circuit board assembly
- F. Housing, LP3P
- G. 1/2" NPT pipe

Español

- A. Lente
- B. Tornillo
- C. Empaquetadura de lente
- D. Tubo estroboscópico
- E. Ensamblaje de placa de circuito impreso
- F. Caja, LP3P
- G. 1/2" NPT tubo

Français

- A. Lentille
- B. Vis
- C. Joint d'étanchéité de lentille
- D. Tube stroboscopique
- E. Plaque de circuits imprimés
- F. Boîtier, LP3P
- G. 1/2" NPT tuyau

290A3627

PD6000 Analog Input Process Meter

Instruction Manual



PROVu
SERIES



- 0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and ± 10 V Inputs
- NEMA 4X, IP65 Front
- Universal 85-265 VAC or 12/24 VDC Input Power
- Large Dual-Line 6-Digit Display, 0.60" & 0.46"
- Isolated 24 VDC @ 200 mA Transmitter Power Supply
- Math Functions for Flow & Round Horizontal Tanks
- Programmable Display & Function Keys
- Sunlight Readable Display
- 32-Point, Square Root, or Exponential Linearization
- Multi-Pump Alternation Control
- 2 or 4 Relays + Isolated 4-20 mA Output Options
- External 4-Relay & Digital I/O Expansion Modules
- RS-232, RS-422/485 Serial Communication Options
- -40 to 65°C Operating Temperature Range

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CAUTION: Read complete instructions prior to installation and operation of the meter.



WARNING: Risk of electric shock or personal injury.



Warning!

This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.

Limited Warranty

Precision Digital Corporation warrants this product against defects in material or workmanship for the specified period under "Specifications" from the date of shipment from the factory. Precision Digital's liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit.

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INTRODUCTION

The PD6000 is a multipurpose, easy to use digital process meter ideal for level, flow rate, temperature, or pressure transmitter applications. It accepts current and voltage signals (e.g. 4-20 mA, 0-10 V). Three of the front panel buttons can be custom-programmed for specific operation.

The basic model includes an isolated 24 VDC transmitter power supply that can be used to power the input transmitter or other devices. An additional isolated 24 VDC power supply is included with the 4-20 mA output option.

A fully loaded PD6000 meter has the following: four SPDT relays, 4-20 mA output, and two 24 VDC power supplies. The PD6000 capabilities may be enhanced by adding the following external expansion modules: four SPST relays –creating an eight-relay process meter–, two digital I/O modules with four inputs and four outputs each, and RS-232 or RS-485 communication adapters.

The eight relays can be used for alarm indication or process control applications, such as pump alternation control. The 4-20 mA isolated output, serial communications, and digital I/O options make the PD6000 an excellent addition to any system.

ORDERING INFORMATION

85-265 VAC Model	12/24 VDC Model	Options Installed
PD6000-6R0	PD6000-7R0	No options
PD6000-6R2	PD6000-7R2	2 relays (PD1102*)
PD6000-6R3	PD6000-7R3	4-20 mA output (PD1103*)
PD6000-6R4	PD6000-7R4	4 relays (PD1104*)
PD6000-6R5	PD6000-7R5	2 relays & 4-20 mA output (PD1105*)
PD6000-6R7	PD6000-7R7	4 relays & 4-20 mA output (PD1107*)
*Model number for replacement option card.		

Accessories

Model	Description
PDA1002	DIN rail mounting kit for two expansion modules
PDA1004	4 SPST (Form A) relays
PDA1044	4 digital inputs & 4 digital outputs (2 may be connected)
PDA1200	Meter copy cable
PDA1232	RS-232 serial adapter
PDA1485	RS-422/485 serial adapter
PDA7485-I	RS-232 to RS-422/485 isolated converter
PDA7485-N	RS-232 to RS-422/485 non-isolated converter
PDA8232-N	USB to RS-232 non-isolated converter
PDA8485-I	USB to RS-422/485 isolated converter
PDA8485-N	USB to RS-422/485 non-isolated converter
PDX6901	Suppressor (snubber): 0.01 μ F/470 Ω , 250 VAC

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SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

General

DISPLAY	Main display: 0.60" (15 mm) high, red LEDs Second display: 0.46" (12 mm) high, red LEDs 6 digits each (-99999 to 999999), with lead zero blanking
DISPLAY INTENSITY	Eight user selectable intensity levels
DISPLAY UPDATE RATE	5/second (200 ms)
OVERRANGE	Display flashes 999999
UNDERRANGE	Display flashes -99999
PROGRAMMING METHODS	Four front panel buttons, digital inputs, PC and multi-point linearization utility, or cloning using Copy function.
NOISE FILTER	Programmable from 2 to 199 (0 will disable filter)
FILTER BYPASS	Programmable from 0.1 to 99.9% of calibrated span
RECALIBRATION	All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.
MAX/MIN DISPLAY	Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
PASSWORD	Three programmable passwords restrict modification of programmed settings. Pass 1: Allows use of the F1–F3 function keys Pass 2: Allows use of the F1–F3 function keys and changing the set/reset points Pass 3: Restricts all programming and F1–F3 keys Note: Digital inputs are not password protected, except programming functions.
NON-VOLATILE MEMORY	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
POWER OPTIONS	85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max or jumper selectable 12/24 VDC $\pm 10\%$, 15 W max
FUSE	Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse
ISOLATED TRANSMITTER POWER SUPPLY	Terminals P+ & P-: 24 VDC $\pm 5\%$ @ 200 mA max (standard), (12/24 VDC powered models rated @ 100 mA max). 5 or 10 VDC @ 50 mA max, selectable with internal jumper J4.
NORMAL MODE REJECTION	Greater than 60 dB at 50/60 Hz

ISOLATION	4 kV input/output-to-power line 500 V input-to-output or output-to-P+ supply
OVERVOLTAGE CATEGORY	Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.
ENVIRONMENTAL	Operating temperature range: -40 to 65°C Storage temperature range: -40 to 85°C Relative humidity: 0 to 90% non-condensing
CONNECTIONS	Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.
ENCLOSURE	1/8 DIN, high impact plastic, UL 94V-0, color: black
MOUNTING	1/8 DIN panel cutout required: 3.622" x 1.772" (92 mm x 45 mm) Two panel mounting bracket assemblies are provided.
TIGHTENING TORQUE	Screw terminal connectors: 5 lb-in (0.56 Nm)
OVERALL DIMENSIONS	4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D)
WEIGHT	9.5 oz (269 g)
WARRANTY	3 years parts & labor

Process Input

INPUTS	Field selectable: 0-20, 4-20 mA, ± 10 V (0-5, 1-5, 0-10 V)
ACCURACY	$\pm 0.03\%$ of calibrated span ± 1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span
TEMPERATURE DRIFT	0.005% of calibrated span/°C max from 0 to 65°C ambient, 0.01% of calibrated span/°C max from -40 to 0°C ambient
MATH FUNCTIONS	Linear, square root, programmable exponent, or round horizontal tank volume calculation
MULTI-POINT LINEARIZATION	2 to 32 points
PROGRAMMABLE EXPONENT	1.0001 to 2.9999
LOW-FLOW CUTOFF	0-999999 (0 disables cutoff function)
DECIMAL POINT	Up to five decimal places or none: <i>dddddd, ddddd, dddd, ddd, dd, or ddddd</i>

CALIBRATION RANGE	Input Range 4-20 mA ± 10 V	Minimum Span Input 1 & Input 2 0.15 mA 0.10 V
	An Error message will appear if the input 1 and input 2 signals are too close together.	
INPUT IMPEDANCE	Voltage ranges: greater than 1 M Ω Current ranges: 50 - 100 Ω (depending on resettable fuse impedance)	
INPUT OVERLOAD	Current input protected by resettable fuse, 30 VDC max. Fuse resets automatically after fault is removed.	

Relays

RATING	2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP @ 125/250 VAC for inductive loads	
NOISE SUPPRESSION	Noise suppression is recommended for each relay contact switching inductive loads; see page 21 for details.	
DEADBAND	0-100% of span, user programmable	
HIGH OR LOW ALARM	User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turn off).	
RELAY OPERATION	Automatic (non-latching) Latching (requires manual acknowledge) Sampling (based on time) Pump alternation control (2 to 8 relays) Off (disable unused relays) Manual control mode	
RELAY RESET	User selectable via front panel buttons or digital inputs - Automatic reset only (non-latching), when the input passes the reset point. - Automatic + manual reset at any time (non-latching) - Manual reset only, at any time (latching) - Manual reset only after alarm condition has cleared (L) <i>Note: Front panel button or digital input may be assigned to acknowledge relays programmed for manual reset.</i>	
TIME DELAY	0 to 999.9 seconds, on & off relay time delays Programmable and independent for each relay	
FAIL-SAFE OPERATION	Programmable and independent for each relay. <i>Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.</i>	
AUTO INITIALIZATION	When power is applied to the meter, relays will reflect the state of the input to the meter.	

Isolated 4-20 mA Transmitter Output

OUTPUT SOURCE	Process variable (PV), max, min, set points 1-8, or manual control mode		
SCALING RANGE	1.000 to 23.000 mA for any display range		
CALIBRATION	Factory calibrated: 4.000 to 20.000 = 4-20 mA output		
ANALOG OUT PROGRAMMING	23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break		
ACCURACY	$\pm 0.1\%$ of span ± 0.004 mA		
TEMPERATURE DRIFT	0.005% of calibrated span/ $^{\circ}$ C max from 0 to 65 $^{\circ}$ C ambient, 0.01% of calibrated span/ $^{\circ}$ C max from -40 to 0 $^{\circ}$ C ambient <i>Note: Analog output drift is separate from input drift.</i>		
ISOLATED TRANSMITTER POWER SUPPLY	Terminals I+ & R: 24 VDC $\pm 5\%$ @ 40 mA maximum; may be used to power the 4-20 mA output or other devices. Refer to Figure 5 on page 18 and Figure 13 on page 22.		
EXTERNAL LOOP POWER SUPPLY	35 VDC maximum		
OUTPUT LOOP RESISTANCE	Power supply	Minimum	Maximum
	24 VDC	10 Ω	700 Ω
	35 VDC (external)	100 Ω	1200 Ω

Serial Communications

METER ADDRESS	1 - 247
BAUD RATE	300 – 19,200 bps
TRANSMIT TIME DELAY	Programmable between 0 and 199 ms or transmitter always on for RS-422 communication
DATA	8 bit (1 start bit, 1 stop bit)
PARITY	None
TURN AROUND DELAY	Less than 2 ms (fixed)

Note: Refer to the PDC Serial Communication Protocol manual located at www.predig.com for details.

PDA1044 Digital Input & Output Expansion Module

CHANNELS	4 digital inputs & 4 digital outputs per module
SYSTEM	Up to 2 modules for a total of 8 inputs & 8 outputs
DIGITAL INPUT LOGIC HIGH	3 to 5 VDC
DIGITAL INPUT LOGIC LOW	0 to 1.25 VDC
DIGITAL OUTPUT LOGIC HIGH	4.75 to 5 VDC
DIGITAL OUTPUT LOGIC LOW	0 to 0.4 VDC
SOURCE CURRENT	10 mA maximum output current
SINK CURRENT	1.5 mA minimum input current
+5 V TERMINAL	To be used as pull-up for digital inputs only. Connect normally open pushbuttons across +5 V & DI1-4.

COMPLIANCE INFORMATION

Safety

UL & c-UL LISTED	USA & Canada UL 508 Industrial Control Equipment
UL FILE NUMBER	E160849
FRONT PANEL	UL Type 4X, NEMA 4X, IP65; panel gasket provided
LOW VOLTAGE DIRECTIVE	EN 61010-1:2001 Safety requirements for measurement, control, and laboratory use

Electromagnetic Compatibility

EMISSIONS	EN 55022:1998/A1:2000/A2:2003 Class A ITE emissions requirements
Radiated Emissions	Class A
AC Mains Conducted Emissions	Class A
IMMUNITY	EN 61000-6-2:2001 EMC heavy industrial generic immunity standard
RFI - Amplitude Modulated	80 -1000 MHz 10 V/m 80% AM (1 kHz)
Electrical Fast Transients	±2kV AC mains, ±1kV other
Electrostatic Discharge	±4kV contact, ±8kV air
RFI - Conducted	10V, 0.15-80 MHz, 1kHz 80% AM
AC Surge	±2kV Common, ±1kV Differential
Surge	1KV (CM)
Power-Frequency Magnetic Field	3 A/m 70%V for 0.5 period
Voltage Dips	40%V for 5 & 50 periods
Voltage Interruptions	<5%V for 250 periods

Note:

Testing was conducted on PD6000 meters installed through the covers of grounded metal enclosures with cable shields grounded at the point of entry representing installations designed to optimize EMC performance.

Declaration of Conformity available at www.predig.com

SAFETY INFORMATION



CAUTION: Read complete instructions prior to installation and operation of the meter.



WARNING: Risk of electric shock or personal injury.



WARNING!

Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.

INSTALLATION

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications. Instructions are provided for 12 VDC meter power and for 5 or 10 V transmitter power applications, see page 16.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout – 3.622" x 1.772" (92 mm x 45 mm). Refer to Figure 1 below, for more details.
- Clearance: allow at least 6.0" (152 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm).
Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.

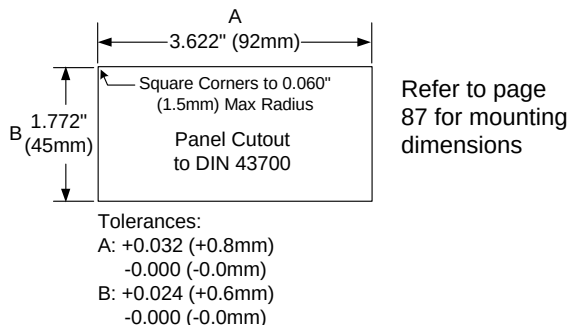
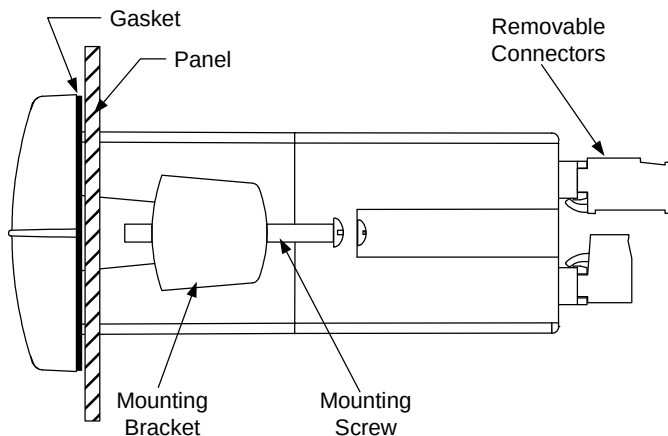


Figure 1. 1/8 DIN Panel Cutout Dimensions

**Figure 2. Panel Mounting Details**

Configuration for 12 or 24 VDC Power Option

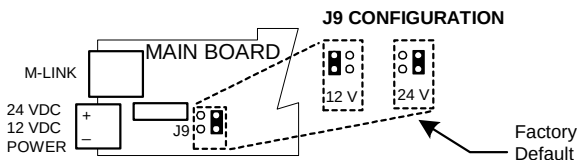


Do not exceed voltage rating of the selected configuration.

Meters equipped with the 12/24 VDC power option are shipped from the factory ready to operate from 24 VDC.

To configure the meter for 12 VDC power:

1. Remove all the connectors.
2. Unscrew the back cover.
3. Slide the back cover about 1 inch.
4. Configure the J9 jumper, located behind the power connector, for 12 V as shown below.

**Figure 3. Jumper Configuration for 12/24 VDC Power**

Transmitter Supply Voltage Selection (P+, P-)

All meters, including models equipped with the 12/24 VDC power option, are shipped from the factory configured to provide 24 VDC power for the transmitter or sensor.

If the transmitter requires 5 or 10 VDC excitation, the internal jumper J4 must be configured accordingly.

To access the voltage selection jumper:

1. Remove all the wiring connectors.
2. Unscrew the back cover.
3. Slide out the back cover by about 1 inch.
4. Configure the J4 jumper, located behind the input signal connector, for the desired excitation voltage as shown.

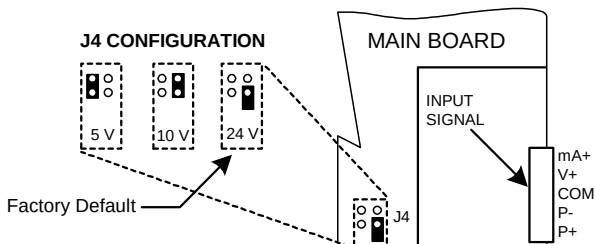


Figure 4. Transmitter Supply Voltage Selection

Connections

All connections are made to removable screw terminal connectors located at the rear of the meter.



Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

Connectors Labeling

The connectors' label, affixed to the meter, shows the location of all connectors available with requested configuration.



Warning!

Do not connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.

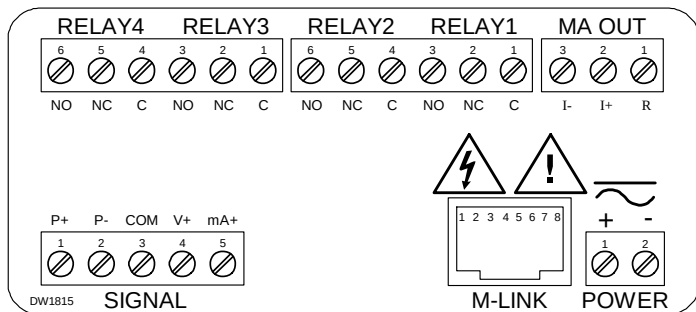
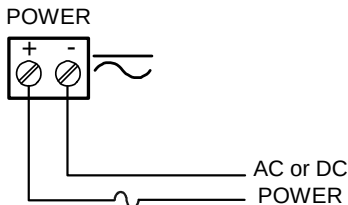


Figure 5. Connector Labeling for Fully Loaded PD6000

Power Connections

Power connections are made to a two-terminal connector labeled POWER on Figure 5. The meter will operate regardless of DC polarity connection. The + and - symbols are only a suggested wiring convention.



Required External Fuse:
5 A max, 250 V Slow Blow

Figure 6. Power Connections

Signal Connections

Signal connections are made to a five-terminal connector labeled SIGNAL on Figure 5. The COM (common) terminal is the return for the 4-20 mA and the ± 10 V input signals.

Current and Voltage Connections

The following figures show examples of current and voltage connections. There are no switches or jumpers to set up for current and voltage inputs. Setup and programming is performed through the front panel buttons.

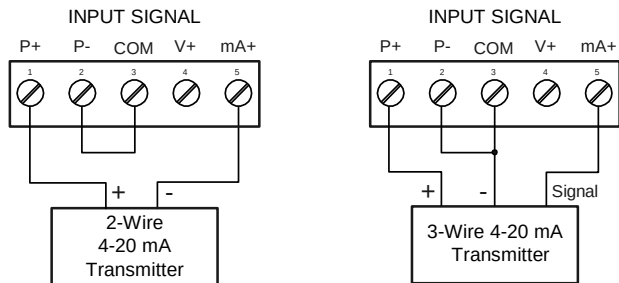


Figure 7. Transmitters Powered by Internal Supply

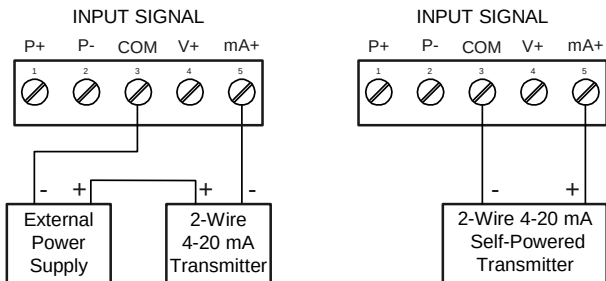


Figure 8. Transmitter Powered by Ext. Supply or Self-Powered

The current input is protected against current overload by a resettable fuse. The display may or may not show a fault condition depending on the nature of the overload.

The fuse limits the current to a safe level when it detects a fault condition, and automatically resets itself when the fault condition is removed.

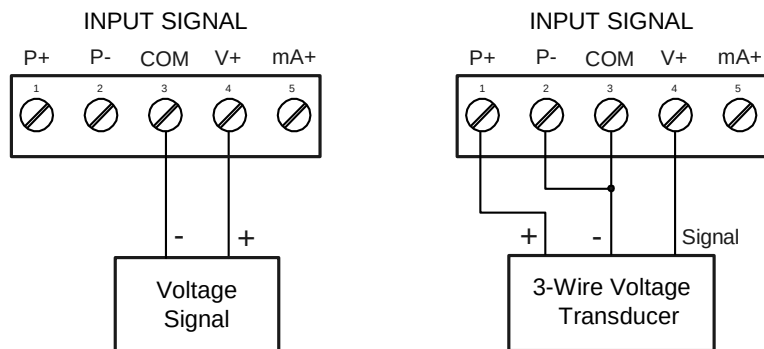


Figure 9. Voltage Input Connections

The meter is capable of accepting any voltage from -10 VDC to +10 VDC.

Serial Communications

Serial communications connection is made to an RJ45 connector labeled M-LINK on Figure 5. Use PDA1232 for RS-232 interfacing or the PDA1485 for RS-422/485 interfacing. The same port is used for interfacing with all expansion modules (e.g. external relays, digital I/O).

Use the PDA1200 meter copy cable for meter-to-meter interfacing for cloning purposes (*i.e.* copying settings from one meter to other meters).

Relay Connections

Relay connections are made to two six-terminal connectors labeled RELAY1 – RELAY4 on Figure 5. Each relay's C terminal is common only to the normally open (NO) and normally closed (NC) contacts of the corresponding relay. The relays' C terminals should not be confused with the COM (common) terminal of the INPUT SIGNAL connector.

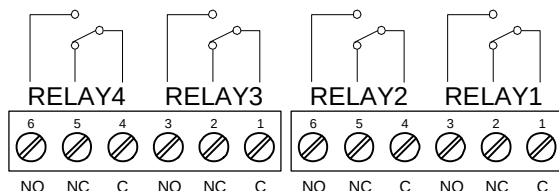


Figure 10. Relay Connections

Switching Inductive Loads

The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:

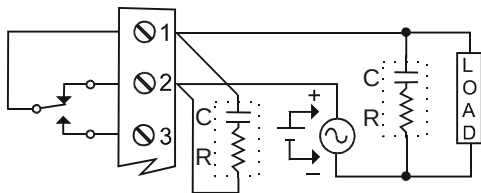


Figure 11. AC and DC Loads Protection

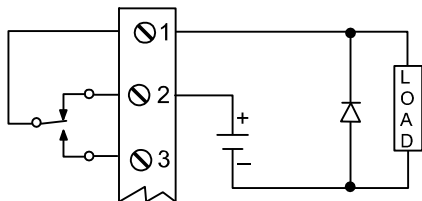
Choose R and C as follows:

R: 0.5 to 1 for each volt across the contacts

C: 0.5 to 1 μF for each amp through closed contacts

Notes:

1. Use capacitors rated for 250 VAC.
2. RC networks may affect load release time of solenoid loads. Check to confirm proper operation.
3. Install the RC network at the meter's relay screw terminals. An RC network may also be installed across the load. Experiment for best results.



Use a diode with a reverse breakdown voltage two to three times the circuit voltage and forward current at least as large as the load current.

Figure 12. Low Voltage DC Loads Protection

RC Networks Available from Precision Digital

RC networks are available from Precision Digital and should be applied to each relay contact switching an inductive load. Part number: PDX6901.

4-20 mA Output Connections

Connections for the 4-20 mA transmitter output are made to the connector terminals labeled MA OUT. The 4-20 mA output may be powered internally or from an external power supply.

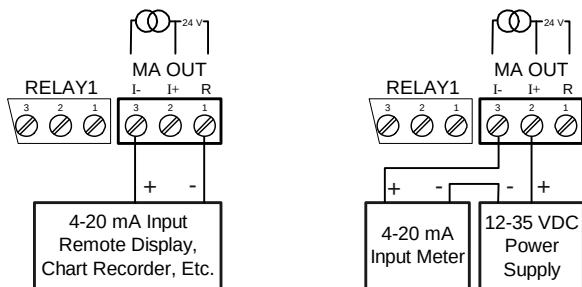


Figure 13. 4-20 mA Output Connections

Analog Output Transmitter Power Supply

The internal 24 VDC power supply powering the analog output may be used to power other devices, if the analog output is not used. The I+ terminal is the +24 V and the R terminal is the return. This power supply is capable of sourcing up to 40 mA.

External Relays & Digital I/O Connections

The relay and the digital I/O expansion modules PDA1004 & PDA1044 are connected to the meter using a CAT5 cable provided with each module. The two RJ45 connectors on the expansion modules are identical and interchangeable; they are used to connect additional modules to the system.

Note: The jumper located between the RJ45 connectors of the PDA1044 must be removed on the second digital I/O module in order for the system to recognize it as module #2.



Warning!

Do not connect or disconnect the expansion modules with the power on!

More detailed instructions are provided with each optional expansion module.



Figure 14. Expansion Modules & DIN Rail Mounting Kit

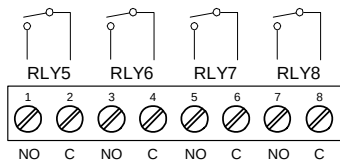


Figure 15. External Relays Module Connections

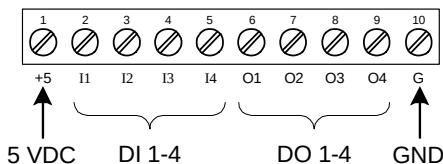


Figure 16. Digital I/O Module Connections

SETUP AND PROGRAMMING

The meter is factory calibrated prior to shipment to read in milliamps and volts depending on the input selection. The calibration equipment is certified to NIST standards.

Overview

There are no jumpers to set for the meter input selection. Setup and programming is done through the front panel buttons. After power and input signal connections have been completed and verified, apply power to the meter.

Front Panel Buttons and Status LED Indicators



Button Symbol	Description
	Menu
	Right arrow/F1
	Up arrow/F2
	Enter/F3

LED	Status
1-4	Alarm 1 – 4 indicator
5-8	Alarm 5 – 8 indicator
Note: <i>Alarms 5-8 are enabled when relay expansion module is installed.</i>	

- Press the Menu button to enter or exit the Programming Mode at any time.
- Press the Right arrow button to move to the next digit during digit or decimal point programming.
- Press the Up arrow button to scroll through the menus, decimal point, or to increment the value of a digit.
- Press the Enter button to access a menu or to accept a setting.
- Press and hold the Menu button for three seconds to access the advanced features of the meter.

Display Functions & Messages

The meter displays various functions and messages during setup, programming, and operation. The following table shows the main menu functions and messages in the order they appear in the menu.

Display	Parameter	Action/Setting Description
rESEt	<i>Reset</i>	Press Enter to access the <i>Reset</i> menu
rSt H	<i>Reset high</i>	Press Enter to reset max display
rSt Lo	<i>Reset low</i>	Press Enter to reset min display
rSt HL	<i>Reset high & low</i>	Press Enter to reset max & min displays
Control	<i>Control</i>	Enter <i>Control</i> menu
Auto	<i>Automatic</i>	Press Enter to set meter for automatic operation
on An	<i>Manual</i>	Press Enter to manually control relays or analog output operation
SEtUP	<i>Setup</i>	Enter <i>Setup</i> menu
inPut	<i>Input</i>	Enter <i>Input</i> selection menu
on R	<i>4-20 mA</i>	Set meter for 4-20 mA input
VolT	<i>0-10 VDC</i>	Set meter for ± 10 VDC input
dEc Pt	<i>Decimal point</i>	Set decimal point
dSPLY	<i>Display</i>	Enter the <i>Display</i> menu
b G	<i>Big display</i>	Press Enter to assign the Main display parameter (default: PV)
L tLE	<i>Little display</i>	Press Enter to assign the small display parameter (default: engineering units)
d- IntY	<i>Display intensity</i>	Set display intensity level from 1 to 8
rELAY	<i>Relay</i>	Enter the <i>Relay</i> menu
rLY 1	<i>Relay 1</i>	Relay 1 setup
Act 1	<i>Action 1</i>	Set relay 1 action
Auto	<i>Automatic</i>	Set relay for automatic reset
R-on An	<i>Auto-manual</i>	Set relay for automatic & manual reset any time

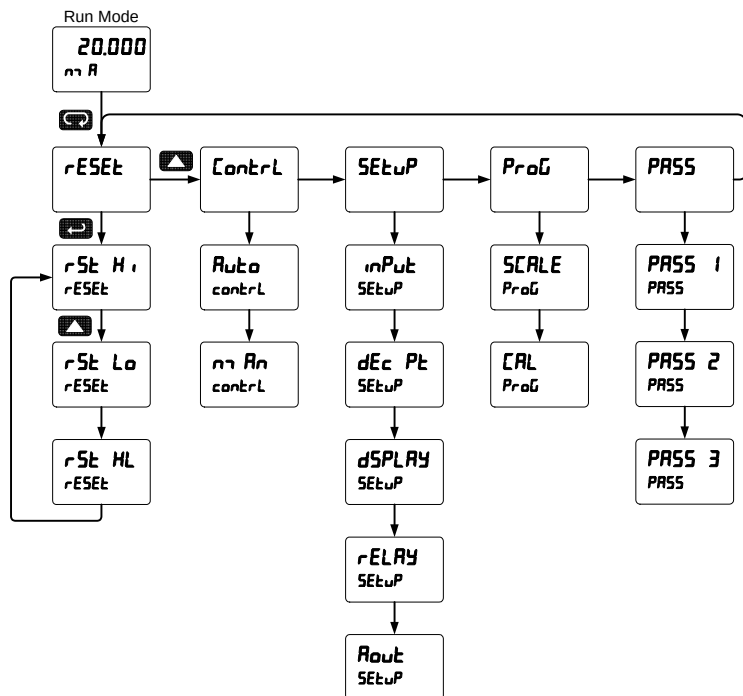
Display	Parameter	Action/Setting Description
LATCH	Latching	Set relay for latching operation
LATCH	Latching-cleared	Set relay for latching operation with manual reset only after alarm condition has cleared
ALTERN	Alternate	Set relay for pump alternation control
SAMPLE	Sampling	Set relay for sampling operation
OFF	Off	Disable relay and front panel status LED
SET 1	Set 1	Program set point 1
RESET 1	Reset 1	Program reset point 1
RELAY 2	Relay 2	Relays 2-8 setup Note: Relays 5-8 are shown, only if expansion relay module is installed.
FAILSAFE	Fail-safe	Enter Fail-safe menu
FLS 1	Fail-safe 1	Set relay 1 fail-safe operation
ON	On	Enable fail-safe operation
FLS 2	Fail-safe 2	Set relays 2-8 fail-safe operation
DELAY	Delay	Enter relay Time Delay menu
DLY 1	Delay 1	Enter relay 1 time delay setup
ON 1	On 1	Set relay 1 On time delay
OFF 1	Off 1	Set relay 1 Off time delay
DLY 2	Delay 2	Enter relays 2-8 time delay setup
BREAK	Loop break	Set relay condition if loop break detected
IGNORE	Ignore	Ignore loop break condition (Processed as a low signal condition)
ON	On	Relay goes to alarm condition when loop break is detected
OFF	Off	Relay goes to non-alarm condition when loop break is detected
ROUT	Analog output	Enter the Analog output scaling menu
DIS 1	Display 1	Program display 1 value
OUT 1	Output 1	Program output 1 value (e.g. 4.000 mA)

Display	Parameter	Action/Setting Description
<i>d iS 2</i>	<i>Display 2</i>	Program display 2 value
<i>Out 2</i>	<i>Output 2</i>	Program output 2 value (e.g. 20.000 mA)
<i>Prog</i>	<i>Program</i>	Enter the <i>Program</i> menu
<i>SCALE</i>	<i>Scale</i>	Enter the <i>Scale</i> menu
<i>CAL</i>	<i>Calibrate</i>	Enter the <i>Calibration</i> menu
<i>inP 1</i>	<i>Input 1</i>	Calibrate input 1 signal or program input 1 value
<i>d iS 1</i>	<i>Display 1</i>	Program display 1 value
<i>inP 2</i>	<i>Input 2</i>	Calibrate input 2 signal or program input 2 value (up to 32 points)
<i>d iS 2</i>	<i>Display 2</i>	Program display 2 value (up to 32 points)
<i>Error</i>	<i>Error</i>	Error, calibration not successful, check signal or programmed value
<i>PASS</i>	<i>Password</i>	Enter the <i>Password</i> menu
<i>PASS 1</i>	<i>Password 1</i>	Set or enter Password 1
<i>PASS 2</i>	<i>Password 2</i>	Set or enter Password 2
<i>PASS 3</i>	<i>Password 3</i>	Set or enter Password 3
<i>unLoc</i>	<i>Unlocked</i>	Program password to lock meter
<i>Locd</i>	<i>Locked</i>	Enter password to unlock meter
<i>999999</i> <i>-999999</i>	<i>Flashing display</i>	Overrange condition Underrange condition

Main Menu

The main menu consists of the most commonly used functions: *Reset*, *Control*, *Setup*, *Program*, and *Password*.

- Press Menu button to enter Programming Mode then press the Up arrow button to scroll main menu.



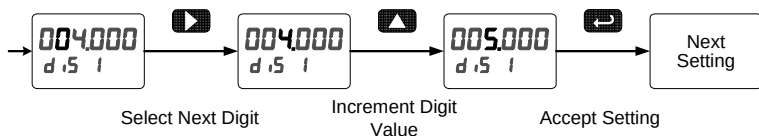
- Press Menu, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing Enter are not saved.
- Changes to the settings are saved to memory only after pressing Enter.
- The display moves to the next menu every time a setting is accepted by pressing Enter.

Setting Numeric Values

The numeric values are set using the Right and Up arrow buttons. Press Right arrow to select next digit and Up arrow to increment digit value.

The digit being changed is displayed brighter than the rest.

Press the Enter button, at any time, to accept a setting or Menu button to exit without saving changes.



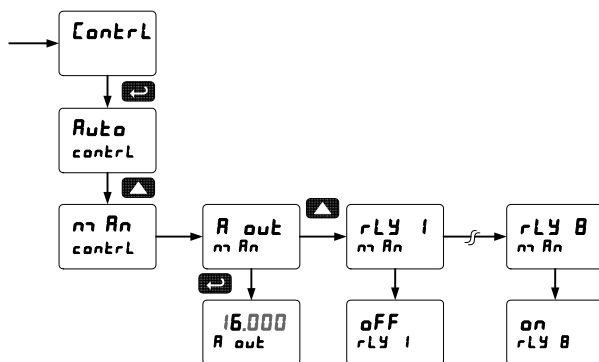
Note: The decimal point is set in the Setup-decimal point menu.

Reset Menu (rESEt)

The *Reset* menu is used to reset the maximum or minimum reading (peak or valley) reached by the process; both may be reset at the same time by selecting “reset high & low” (rSEt HL).

Control Menu (ContrL)

The *Control* menu is used to control the 4-20 mA analog output and the relays manually, ignoring the input. Each relay and analog output can be programmed independently for manual control. Selecting automatic control sets all relays and analog output for automatic operation.

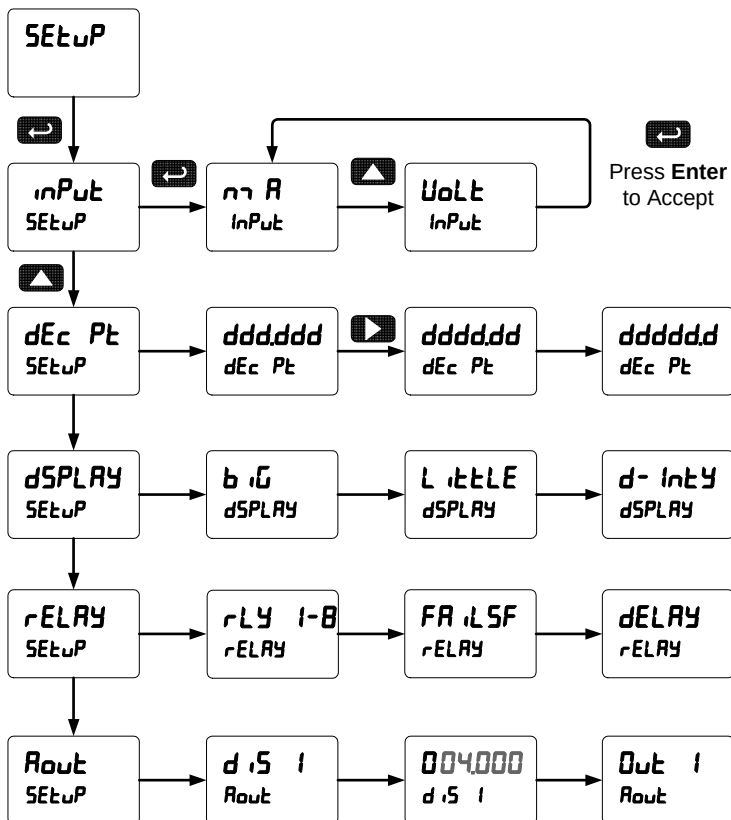


Setting Up the Meter (SEtUP)

The *Setup* menu is used to select:

1. Input signal the meter will accept
2. Decimal point position
3. Display parameter and intensity
4. Relay operation
5. 4-20 mA analog output scaling

Press the Enter button to access any menu or press Up arrow button to scroll through choices. Press the Menu button to exit at any time.



Setting the Input Signal (INPUL)

Enter the *Input* menu to set up the meter to display current (mA) or voltage (VDC) inputs.

The current input is capable of accepting any signal from 0 to 20 mA. Select current input to accept 0-20 mA or 4-20 mA signals.

The voltage input is capable of accepting any signal from -10 to +10 VDC. Select voltage input to accept 0-5, 1-5, 0-10, or ± 10 VDC signals.

Setting the Decimal Point (DEC PL)

The decimal point may be set with up to five decimal places or with no decimal point at all.

Pressing the Right arrow moves the decimal point one place to the right until no decimal point is displayed, and then it moves to the leftmost position.

Setting the Display Parameter & Intensity (DISPLAY)

The main display (b L) can be programmed to display:

1. Process value
2. Relay set points
3. Max & min values

The small display (L L L L) can be programmed to display:

1. Process value
2. Relay set points
3. Max & min values
4. Engineering units or custom legends
5. Off (no display)

Display Intensity: The meter has eight display intensity levels to give the best performance under various lighting conditions. Select intensity 8 for outdoor applications.

Character Set for Engineering Units Display (ד ט ח ז)

The small display can be programmed to show engineering units or custom legends using the following 7-segment character set:

0 1 2 3 4 5 6 7 8 9 A b C c d E F G 9 H h i . J K L
 n O o P q r S t u V W X Y Z - / = [] ^ _ ` °

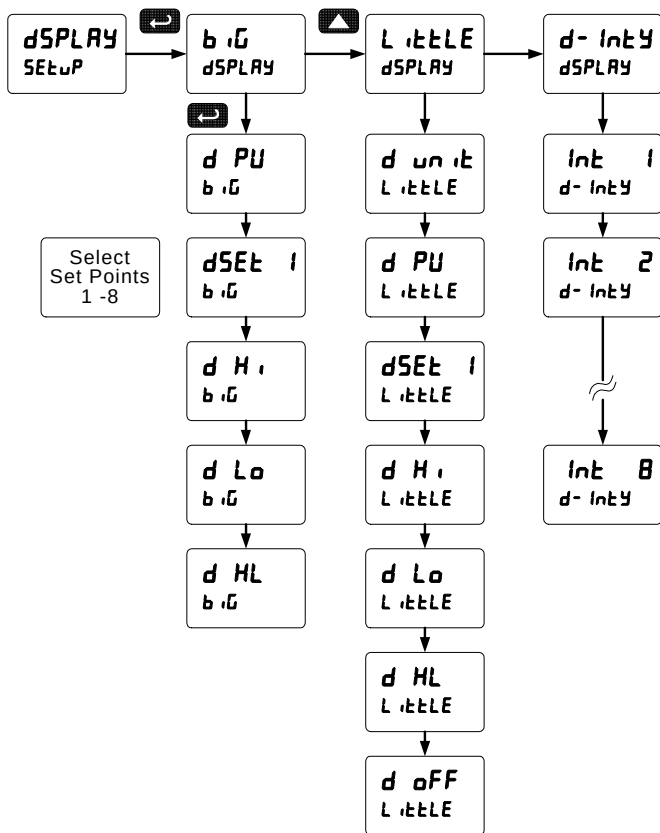
To create the letter “m” use the characters “ח” followed by “ר” to get “ח ר”.

To create the letter “w” use the characters “ט” followed by “ז” to get “ט ז”.

See the flow chart on the next page to access the display units menu.

Display Setup Menu

- Press the Up arrow to change selection
- Press Enter to accept setting
- Press Menu to exit programming



After setting up the input and display, press the Menu button to exit programming and skip the rest of the setup menu. Press the Menu button again and the Up arrow to reach the *Program* menu and complete the scaling or calibration of the meter.

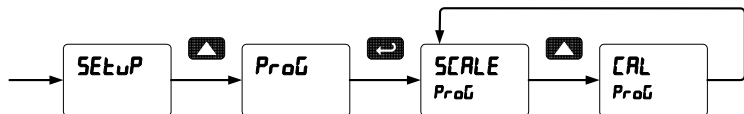
Programming the Meter (*Prog*)

It is **very important** to read the following information, before proceeding to program the meter:

- The meter is factory calibrated prior to shipment to read in milliamps and volts depending on the input selection. The calibration equipment is certified to NIST standards.
- Use the *Scale* menu to scale the process inputs (e.g. 4-20 mA). A calibrated signal source is not needed to scale the meter.

The *Program* menu contains the *Scale* and the *Calibrate* menus.

The process inputs may be calibrated or scaled to any display value within the range of the meter.



Additional parameters, not needed for most applications, are programmed in the *Advanced Features* menu; see *Advanced Features Menu*, page 60.

Multi-Point Calibration & Scaling

The meter is set up at the factory for 2-point linear calibration. The number of points for multi-point calibration/scaling is set up in the *Advanced Features* menu. Up to 32 linearization points may be selected. See page 66 for details.

Multi-Point Linearization Utility

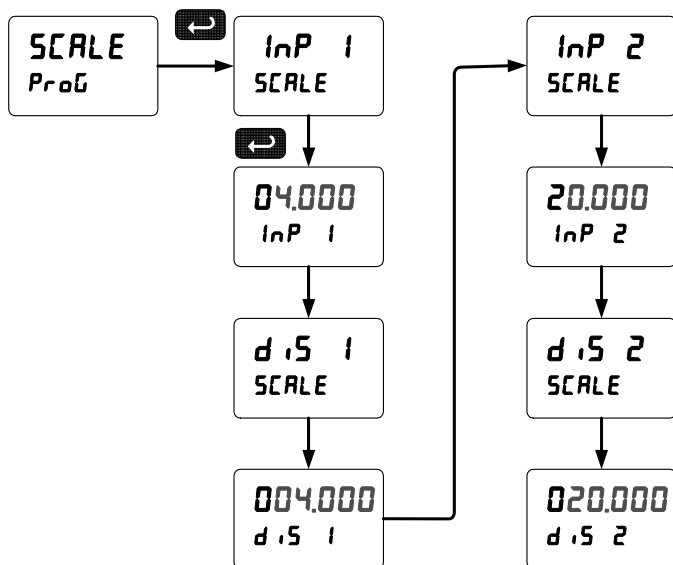
The meter can be programmed for multi-point scaling using the PC-based Multi-Point Linearization Utility available for free download at www.predig.com.

In order to program the meter using a computer, the meter must be connected using an RS-232 or RS-485 serial adapter, see ORDERING INFORMATION on page 3 for details.

Scaling the Meter (SCALE)

The process inputs (4-20 mA and ± 10 VDC) can be scaled to display the process variable in engineering units.

A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.



For instructions on how to program numeric values see *Setting Numeric Values*, page 30.

Error Message (*Error*)

An error message indicates that the calibration or scaling process was not successful.

After the error message is displayed, the meter reverts to input 2 during calibration or scaling and to input 1 during internal calibration, allowing the appropriate input signal to be applied or programmed.

The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals or it is connected backwards.
2. Wrong signal selection in *Setup* menu.
3. Minimum input span requirements not maintained.
4. Input 1 signal inadvertently applied to calibrate input 2.

Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter.

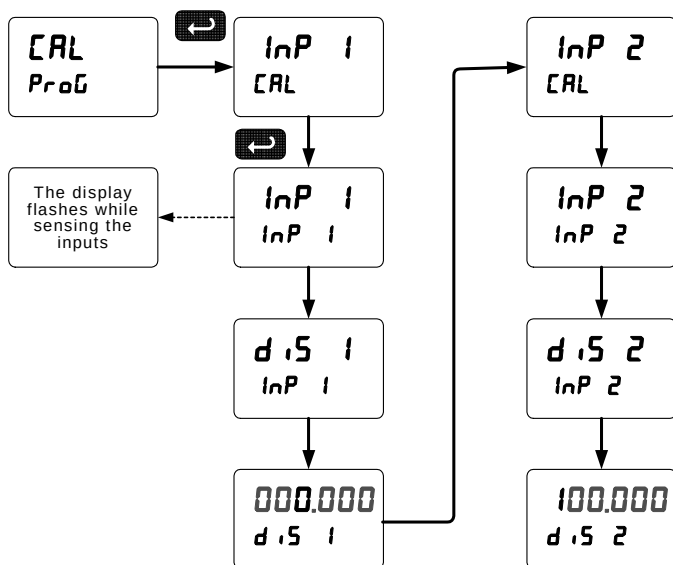
Input Range	Input 1 & Input 2 Span
4-20 mA	0.15 mA
±10 VDC	0.10 VDC

Calibrating the Meter with External Source (CAL)

To scale the meter without a signal source refer to Scaling the Meter (SCALE), page 36.

The meter can be calibrated to display the process variable in engineering units by applying the appropriate input signal and following the calibration procedure.

The use of a calibrated signal source is strongly recommended to calibrate the meter.



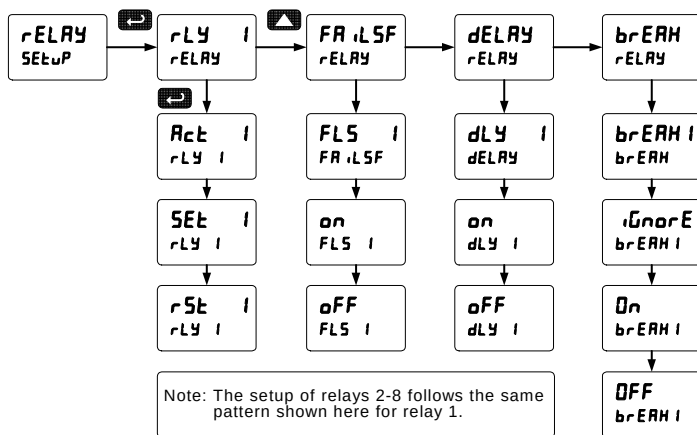
Warm up the meter for at least 15 minutes before performing calibration to ensure specified accuracy.

Setting the Relay Operation (rELAY)

This menu is used to set up the operation of the relays.

CAUTION! During setup, the relays do not follow the input and they will remain in the state found prior to entering the Relay menu.

1. Relay action
 - a. Automatic reset only (non-latching)
 - b. Automatic + manual reset at any time (non-latching)
 - c. Latching (manual reset only)
 - d. Latching with Clear (manual reset only after alarm condition has cleared)
 - e. Pump alternation control (automatic reset only)
 - f. Sampling (the relay is activated for a user-specified time)
 - g. Off (relay and status LED disabled)
2. Set point
3. Reset point
4. Fail-safe operation
 - a. On (enabled)
 - b. Off (disabled)
5. Time delay
 - a. On delay (0-999.9 seconds)
 - b. Off delay (0-999.9 seconds)
6. Relay action for loss (break) of 4-20 mA input (ignore, on, off)

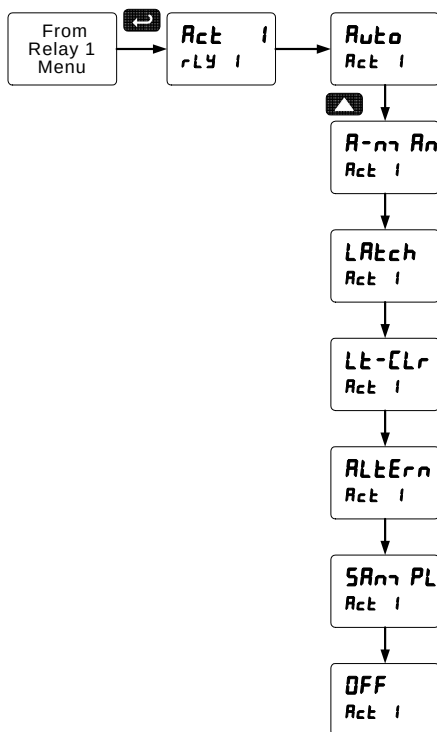


Setting the Relay Action

Operation of the relays is programmed in the *Action* menu. The relays may be set up for any of the following modes of operation:

1. Automatic reset (non-latching)
2. Automatic + manual reset at any time (non-latching)
3. Latching (manual reset only, at any time)
4. Latching with Clear (manual reset only after alarm condition has cleared)
5. Pump alternation control (automatic reset only)
6. Sampling (the relay is activated for a user-specified time)
7. Off (relay and status LED disabled)

The following graphic shows relay 1 action setup; relay 2-8 are set up in a similar fashion.

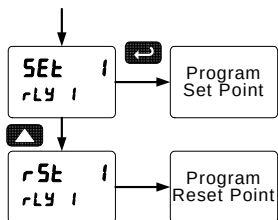


Programming Set and Reset Points

High alarm indication: program set point above reset point.

Low alarm indication: program set point below reset point.

The deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If the set and reset points are programmed with the same value, the relay will reset one count below the set point.



Setting Fail-Safe Operation

In fail-safe mode of operation, the relay coil is energized when the process variable is within safe limits and the relay coil is de-energized when the alarm condition exists. The fail-safe operation is set independently for each relay. Select **on** to enable or select **off** to disable fail-safe operation.

Programming Time Delay

The *On* and *Off* time delays may be programmed for each relay between 0 and 999.9 seconds. The relays will transfer only after the condition has been maintained for the corresponding time delay.

The *On* time delay is associated with the set point.

The *Off* time delay is associated with the reset point.

Relay Action for Loss of 4-20 mA Input (Loop Break)

The loop break feature is associated with the 4-20 mA input. Each relay may be programmed to go to one of the following conditions when the meter detects the loss of the input signal (i.e. < 0.005 mA):

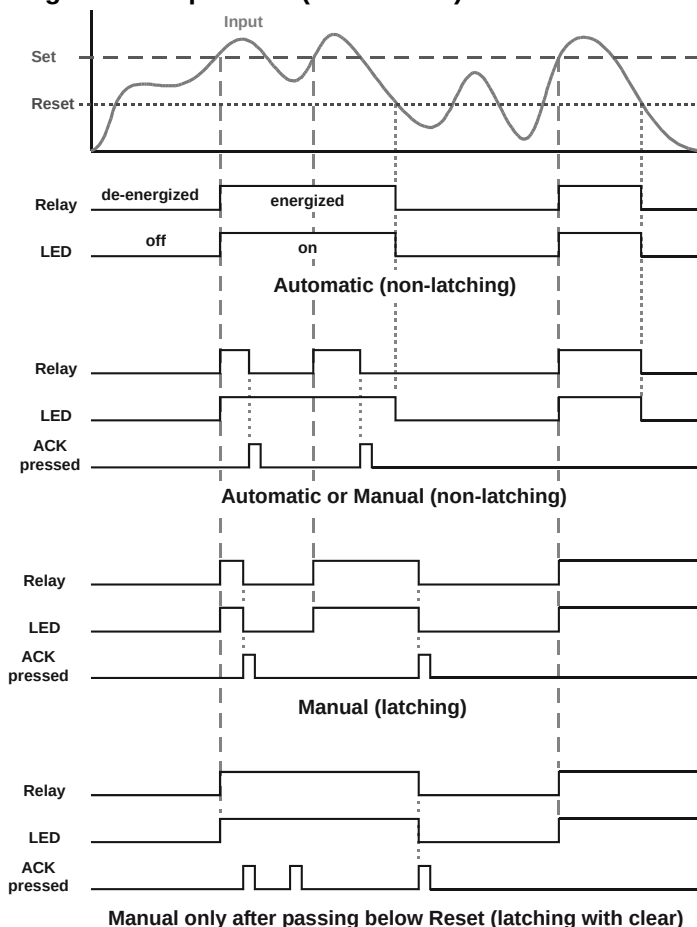
1. Turn *On* (Go to alarm condition)
2. Turn *Off* (Go to non-alarm condition)
3. Ignore (Processed as a low signal condition)

Note: This is not a true loop break condition; if the signal drops below 0.005 mA, it is interpreted as a "loop break" condition.

Relay and Alarm Operation Diagrams

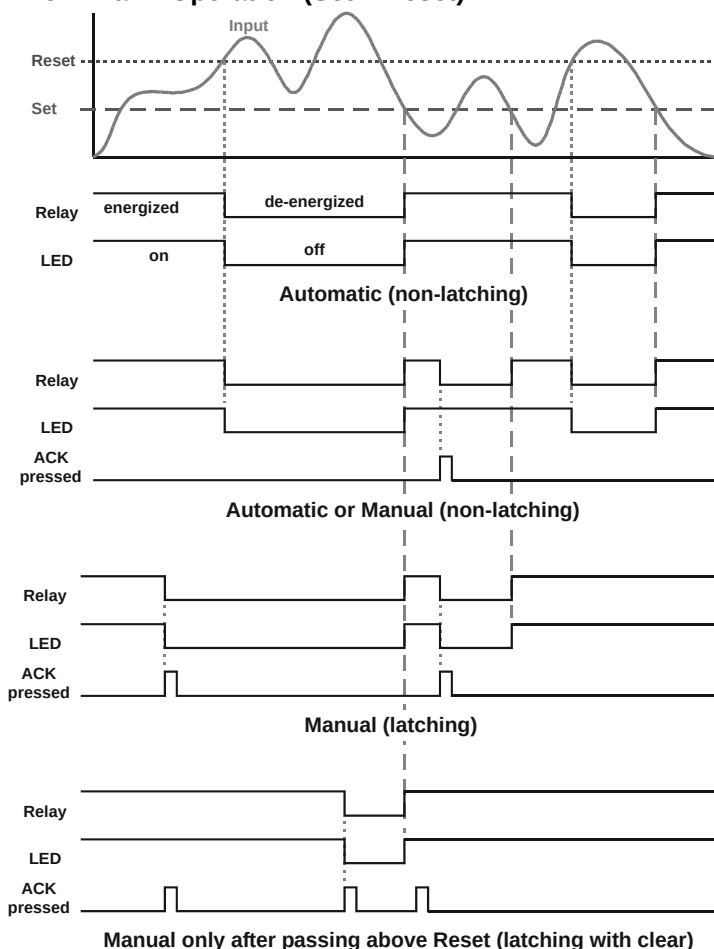
The following graphs illustrate the operation of the relays, status LEDs, and ACK button.

High Alarm Operation (Set > Reset)



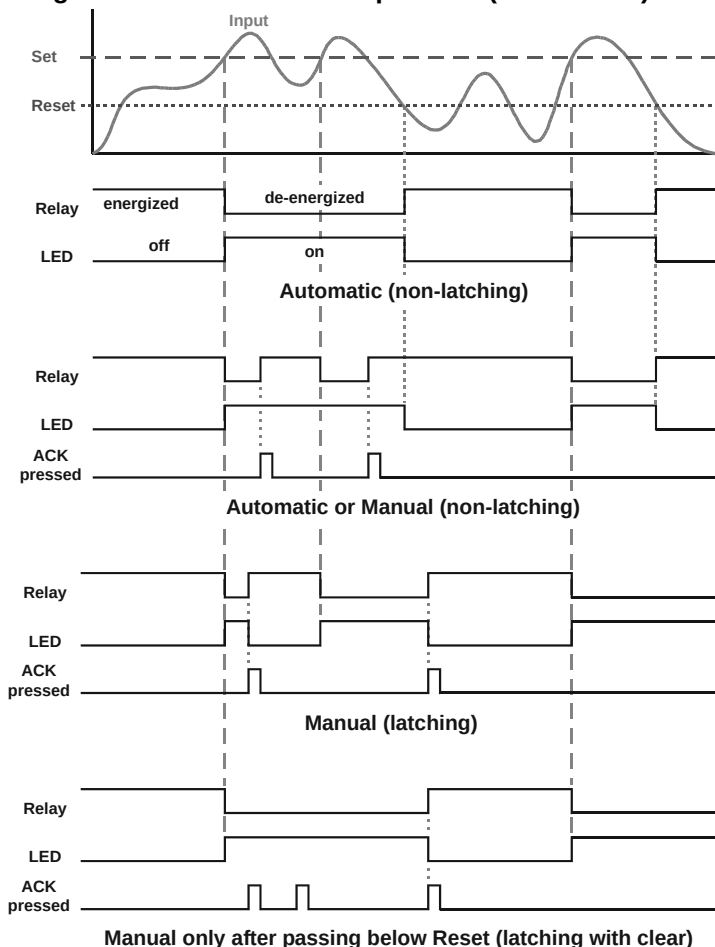
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. To detect a new alarm condition, the signal must go below the set point, and then go above it.

Low Alarm Operation (Set < Reset)



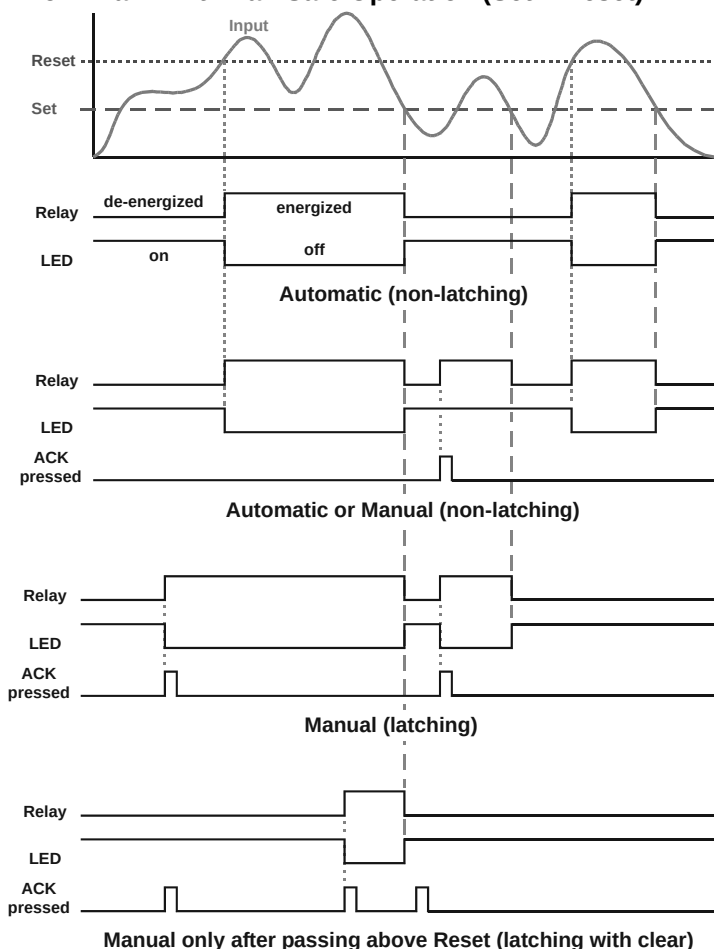
For Manual reset mode, ACK can be pressed anytime to turn "off" relay. For relay to turn back "on", signal must go above set point, and then go below it.

High Alarm with Fail-Safe Operation (Set > Reset)



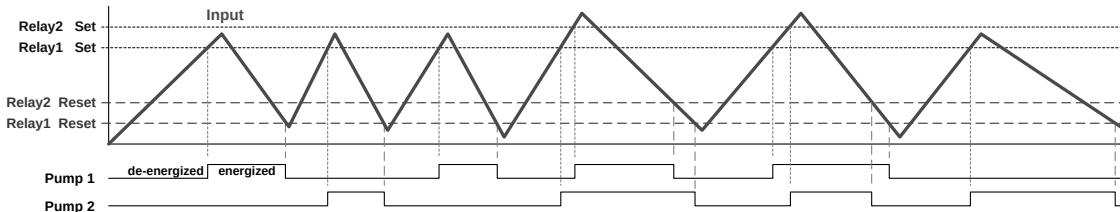
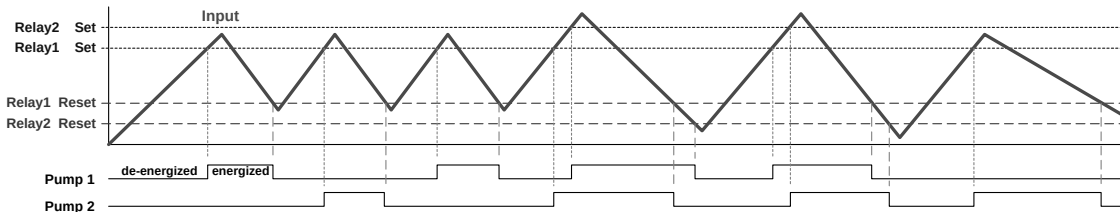
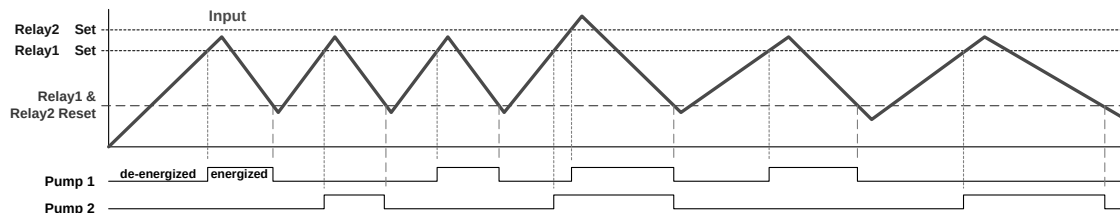
*Note: Relay coil is energized in non-alarm condition.
In case of power failure, relay will go to alarm state.*

Low Alarm with Fail-Safe Operation (Set < Reset)



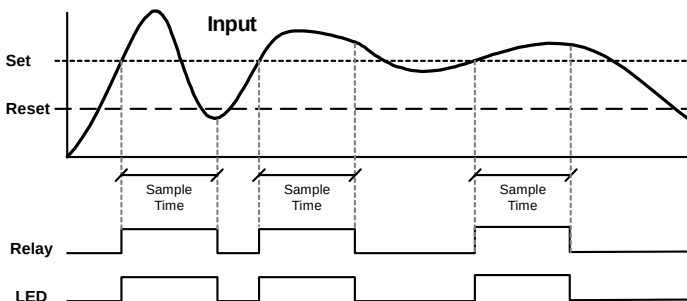
*Note: Relay coil is energized in non-alarm condition.
In case of power failure, relay will go to alarm state.*

Pump Alternation Control Operation



LEDs indicate the relay status

Relay Sampling Operation

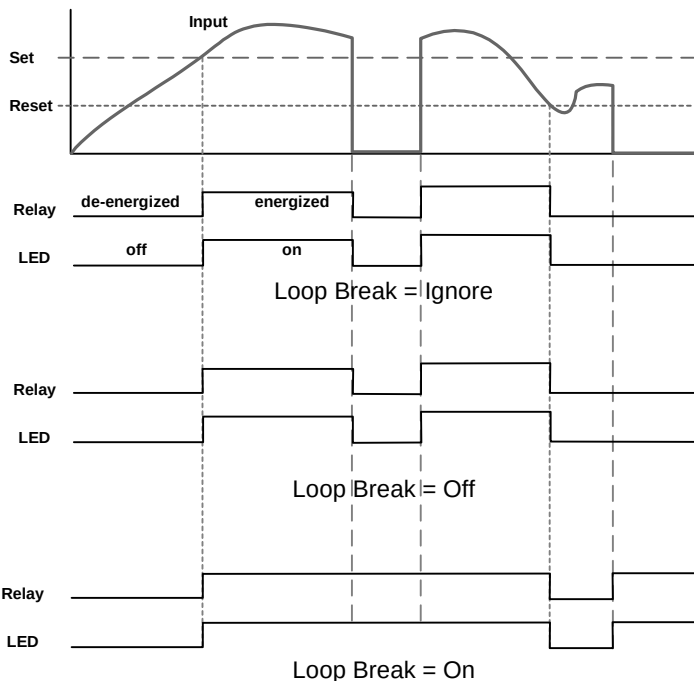


When the signal crosses the set point, the relay trips and the sample time starts. After the sample time has elapsed, the relay resets. The cycle repeats every time the set point is crossed, going up for high alarms and going down for low alarms.

The sample time can be programmed between 0.1 and 5999.9 seconds.

Signal Loss or Loop Break Relay Operation

The following graph shows the loop break relay operation for a high alarm relay.

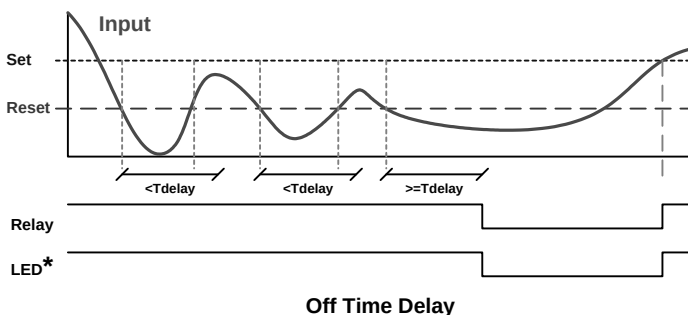
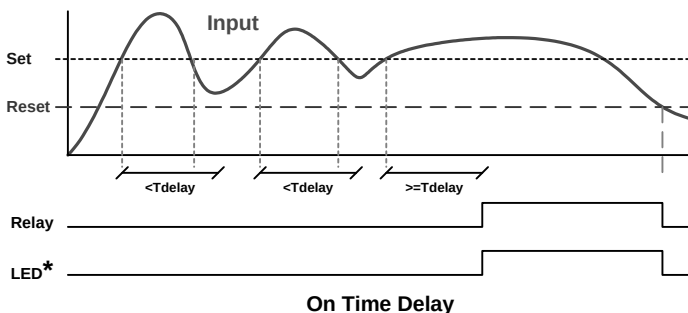


When the meter detects a break in the 4-20 mA loop, the relay will go to one of the following selected actions:

1. Turn *On* (Go to alarm condition)
2. Turn *Off* (Go to non-alarm condition)
3. Ignore (Processed as a low signal condition)

Time Delay Operation

The following graphs show the operation of the time delay function.



When the signal crosses the set point, the *On* time delay timer starts and the relay trips when the time delay has elapsed. If the signal drops below the set point (high alarm) before the time delay has elapsed, the *On* time delay timer resets and the relay does not change state. The same principle applies to the *Off* time delay.

* Note: If “Automatic or Manual (R-n Rn)” reset mode is selected, the LED follows the reset point and not the relay state when the relay is acknowledged.

Relay Operation Details

Overview

The relay capabilities of the meter expand its usefulness beyond simple indication to provide users with alarm and control functions. These capabilities include front panel alarm status LEDs as well as either 2 or 4 optional internal relays and/or 4 external relays expansion module. Typical applications include high or low temperature, level, pressure or flow alarms, control applications such as simple on/off pump control, and pump alternation control for up to 8 pumps. There are four basic ways the relays can be used:

1. High or Low Alarms with Latching or Non-Latching Relays
2. Simple On/Off Control with 100% Adjustable Deadband
3. Sampling (Based on Time)
4. Pump Alternation Control for up to 8 Pumps

Relays Auto Initialization

When power is applied to the meter, the front panel LEDs and alarm relays will reflect the state of the input to the meter. The following table indicates how the alarm LEDs and relays will react on power-up based on the set and reset points:

Alarm #	HI or LO Alarm	Set Point	Reset Point	Power-Up Reading	Relay & LED
1	HI	1000	500	499	Off
2	LO	700	900	499	On
3	LO	250	400	499	Off
4	HI	450	200	499	On

Fail-Safe Operation

The following table indicates how the relays behave based on the fail-safe selection for each relay:

Fail-Safe Selection	Non-Alarm State		Alarm State		Power Failure
	NO	NC	NO	NC	
Off	Open	Closed	Closed	Open	Relays go to non-alarm state
On	Closed	Open	Open	Closed	Relays go to alarm state

Note: NO = Normally Open, NC = Normally Closed. This refers to the condition of the relay contacts when the power to the meter is off.

Front Panel LEDs

The LEDs on the front panel provide status indication for the following:

LED	Status
1	Alarm 1
2	Alarm 2
3	Alarm 3
4	Alarm 4

LED	Status
5	Alarm 5
6	Alarm 6
7	Alarm 7
8	Alarm 8

The meter is supplied with four alarm points that include front panel LEDs to indicate alarm conditions. This standard feature is particularly useful for alarm applications that require visual-only indication. The LEDs are controlled by the set and reset points programmed by the user. When the display reaches a set point for a high or low alarm, the corresponding alarm LED will turn on. When the display returns to the reset point the LED will go off. The front panel LEDs respond differently for latching and non-latching relays.

For non-latching relays, the LED is always off during normal condition and always on during alarm condition, regardless of the state of the relay (e.g. Relay acknowledged after alarm condition).

For latching relays, the alarm LEDs reflect the status of the relays, regardless of the alarm condition. The following tables illustrate how the alarm LEDs function in relation to the relays and the acknowledge button (Default: F3 key assigned to ACK):

Latching and Non-Latching Relay Operation

The relays can be set up for latching (manual reset) or non-latching (automatic reset) operation.

Relay terminology for following tables

Terminology	Relay Condition
On	Alarm (Tripped)
Off	Normal (Reset)
Ack	Acknowledged

The On and Off terminology does not refer to the status of the relay's coil, which depends on the fail-safe mode selected.



In latching relay mode, latched relays will reset (unlatch) when power is cycled.

Warning!

Non-Latching Relay (R_uL_o)**Automatic reset only**

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack (No effect)	On	On
Normal	Off	Off

In this application, the meter is set up for automatic reset (non-latching relay). Acknowledging the alarm while it is still present has no effect on either the LED or the relay. When the alarm finally goes away, the relay automatically resets and the LED also goes off.

Non-Latching Relay (R_u-_{nn} R_n)**Automatic + manual reset at any time**

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Normal	Off	Off
Next Alarm	On	On
Ack	On	Off
Normal	Off	Off

In this application, the meter is set up for automatic and manual reset at any time (non-latching relay). The LED and the relay automatically reset when the meter returns to the normal condition.

The next time an alarm occurs, the operator acknowledges the alarm manually while the alarm condition still exists. This causes the relay to reset, but the LED stays on until the meter returns to the normal condition.

Latching Relay (L_RL_oL_H)**Manual reset any time**

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack	Off	Off

In this application, the meter is set up for manual reset at any time. Acknowledging the alarm even if the alarm condition is still present resets the relay and turns off the LED.

Latching Relay (LE-LE)

Manual reset only after alarm condition has cleared

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack (No effect)	On	On
Normal	On	On
Ack	Off	Off

In this application, the meter is set up for manual reset only after the signal passes the reset point (alarm condition has cleared). Acknowledging the alarm while it is still present has no effect on either the LED or the relay. When the alarm is acknowledged after it returns to the normal state, the LED and the relay go off. Notice that the LED remains on, even after the meter returns to the normal condition. This is because, for latching relays, the alarm LED reflects the status of the relay, regardless of the alarm condition.

Acknowledging Relays

There are two ways to acknowledge relays programmed for manual reset: via the programmable front panel function keys F1-F3 (Default: F3 assigned to ACK) and remotely via a normally open pushbutton wired across one of the digital inputs and the +5 V terminals on the digital I/O modules (Default: DI-4 assigned to ACK). When the ACK button or the assigned digital input is closed, all relays programmed for manual reset are acknowledged.

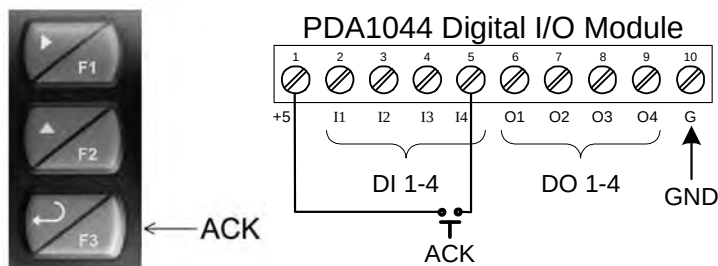


Figure 17. Acknowledge Relays w/Function Key or Digital Input

Pump Alternation Control Applications (ALtErn)

For pump control applications where two or more similar pumps are used to control the level of a tank or a well, it is desirable to have all the pumps operate alternately. This prevents excessive wear and overheating of one pump over the lack of use of the other pumps.

Up to 8 relays can be set up to alternate every time an on/off pump cycle is completed. The set points and reset points can be programmed, so that the first pump on is the first pump off.

Application #1: Pump Alternation Using Relays 1 & 2

1. Relays 1 and 2 are set up for pump alternation.
2. Relays 3 and 4 are set up for low and high alarm indication.

Set and Reset Point Programming

Relay	Set Point	Reset Point	Function
1	30.000	10.000	Controls pump #1
2	35.000	5.000	Controls pump #2
3	4.000	9.000	Controls low alarm
4	40.000	29.000	Controls high alarm

Pump Alternation Operation

1. Pump #1 turns on when level reaches 30.000, when level drops below 10.000 pump #1 turns off.
2. The next time level reaches 30.000, pump #2 turns on, when level drops below 10.000 pump #2 turns off.
3. If the level doesn't reach 35.000 pump #1 and pump #2 will be operating alternately.
4. If pump #1 cannot keep the level below 35.000 pump #2 will turn on at 35.000, then as the level drops to 10.000 pump #1 turns off, pump #2 is still running and shuts off below 5.000.
5. Notice that with the set and reset points of pump #2 outside the range of pump #1, the first pump on is the first pump to go off. This is true for up to 8 alternating pumps, if setup accordingly.
6. Relay #3 will go into alarm if the level drops below 4.000 and relay #4 will go into alarm if the level exceeds 40.000.
7. Adding the 4 external relays expansion module allows using the 4 SPDT internal relays for pump alternation and the 4 SPST external relays for high, high-high, low, and low-low alarm indication.

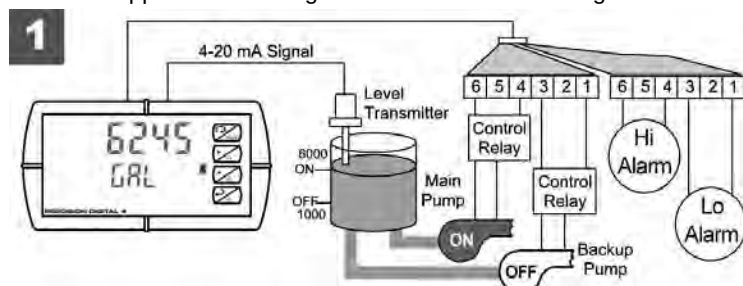
Application #2: Pump Alternation Using Relays 3 & 4

1. Relays 1 and 2 are set up for low and high alarm indication.
2. Relays 3 and 4 are set up for pump alternation.

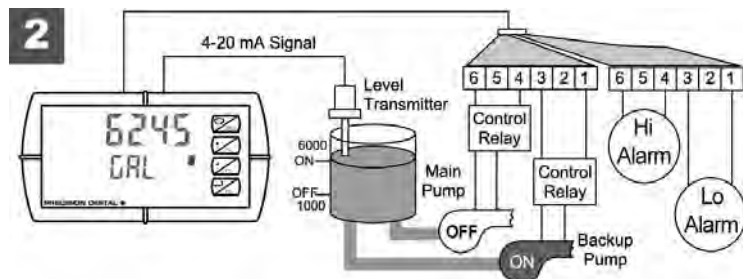
Set and Reset Point Programming

Relay	Set Point	Reset Point	Function
1	495	750	Controls low alarm
2	7500	6900	Controls high alarm
3	7000	900	Controls backup pump
4	6000	1000	Controls main pump

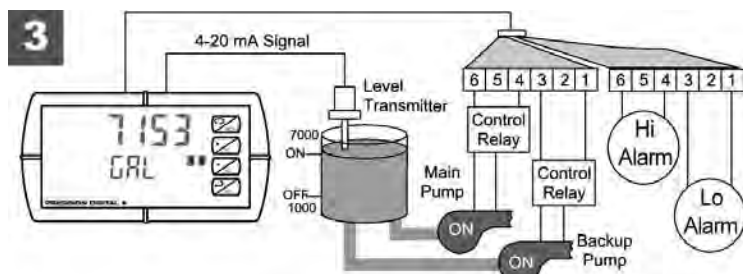
The following graphics provide a visual representation of a typical pump alternation application with high and low alarm monitoring:



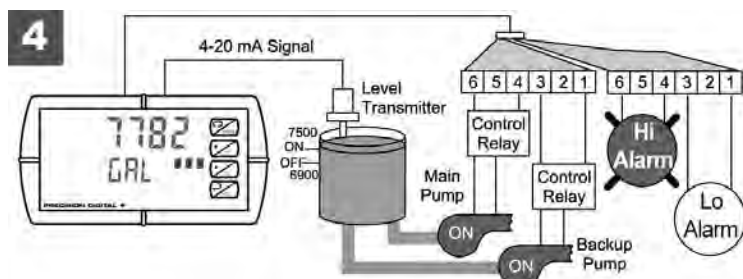
1. Relay #4 turns the main pump on at 6000 gallons and turns it off at 1000 gallons.



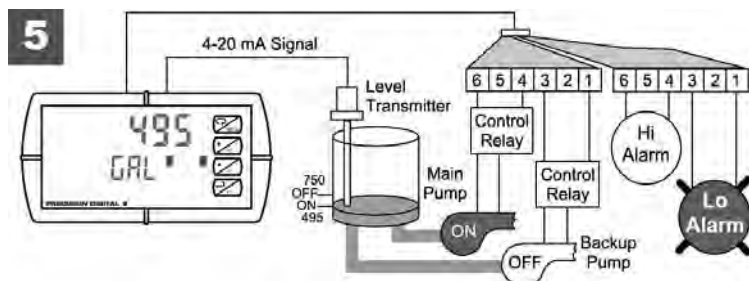
2. With the Pump Alternation feature activated, the next time the level reaches 6000 gallons, relay #3 transfers and starts the backup pump.



3. If the backup pump is not able to keep up, and the level reaches 7000 gallons, relay #4 transfers and starts the main pump as well.



4. Relay #2 trips the High Level Alarm at 7500 gallons and resets at 6900 gallons.



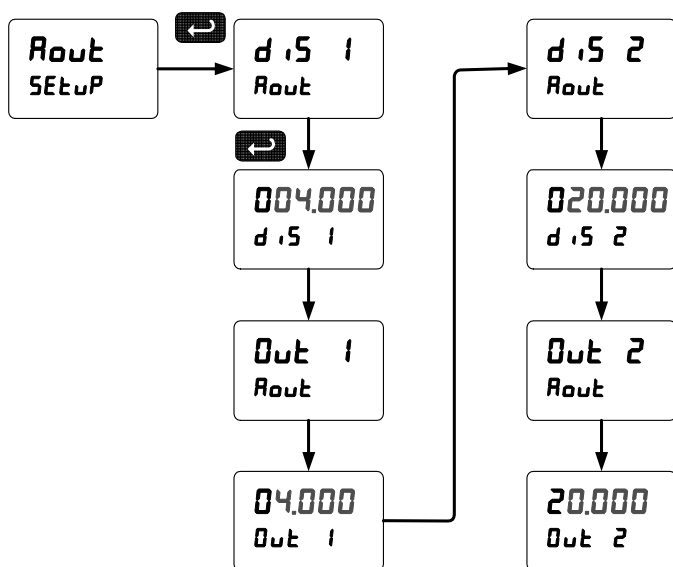
5. Relay #1 trips the Low Level Alarm at 495 gallons and resets at 750 gallons.

Scaling the 4-20 mA Analog Output (Rout)

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any display range selected.

No equipment is needed to scale the analog output; simply program the display values to the corresponding mA output signal.

The *Analog Output* menu is used to program the 4-20 mA output based on display values.



For instructions on how to program numeric values see *Setting Numeric Values*, page 30.

Setting Up the Password (PASS)

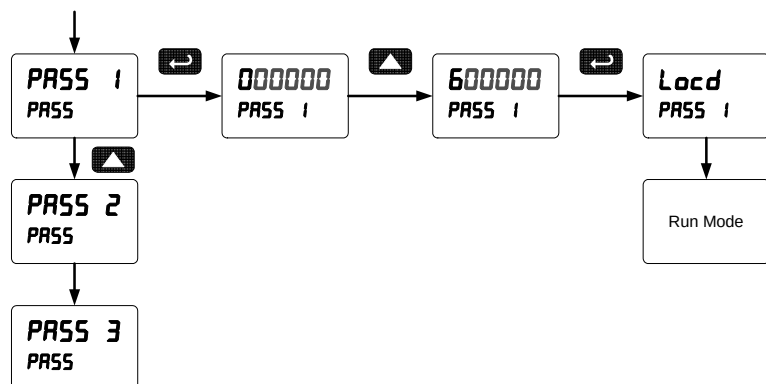
The *Password* menu is used for programming three levels of security to prevent unauthorized changes to the programmed parameter settings.

Pass 1: Allows use of the F1–F3 function keys
 Pass 2: Allows use of the F1–F3 function keys and changing the set/reset points
 Pass 3: Restricts all programming and F1–F3 keys
 Note: Digital inputs are not password protected

Protecting or Locking the Meter

Enter the *Password* menu and program a six-digit password.

For instructions on how to program numeric values see *Setting Numeric Values*, page 30.



Record the password for future reference. If appropriate, it may be recorded in the space provided.

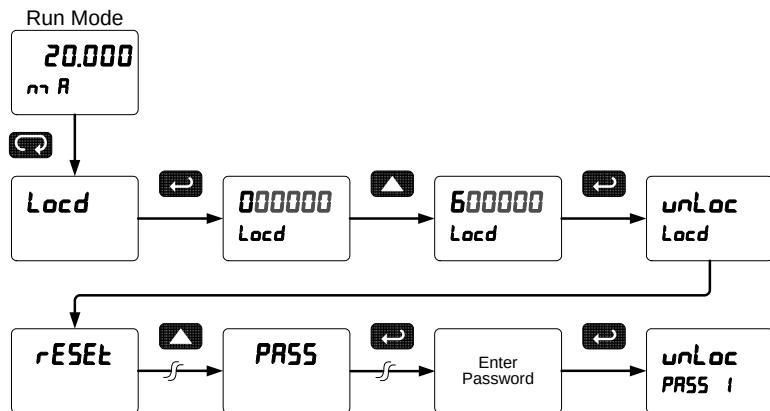
Model:	
Serial Number:	
Password 1:	— — — — —
Password 2:	— — — — —
Password 3:	— — — — —

Making Changes to a Password Protected Meter

If the meter is password protected, the meter will display the message **Locd** (Locked) when the Menu button is pressed. Press the Enter button while the message is being displayed and enter the correct password to gain access to the menu. After exiting the programming mode, the meter returns to its password protected condition.

Disabling Password Protection

To disable the password protection, access the *Password* menu and enter the correct password twice, as shown below. The meter is now unprotected until a new password is entered.



If the correct six-digit password is entered, the meter displays the message **unLoc** (unlocked) and the protection is disabled until a new password is programmed.

If the password entered is incorrect, the meter displays the message **Locd** (Locked) for about two seconds, and then it returns to Run Mode. To try again, press Enter while the *Locked* message is displayed.

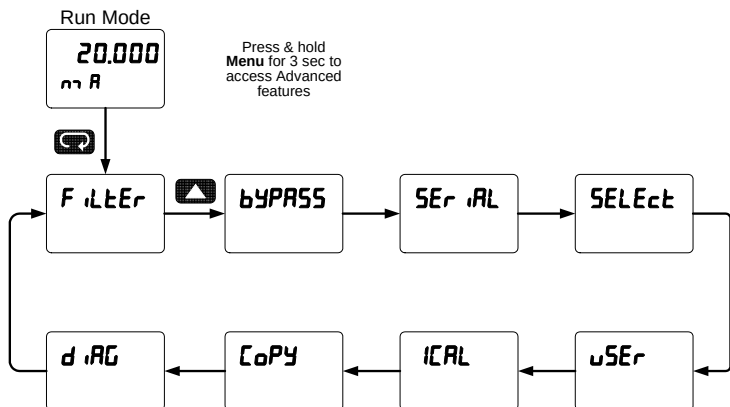
Did you forget the password?

The password may be disabled by entering a master password. If you are authorized to make changes, enter the master password 508655 to unlock the meter.

Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the *Advanced Features* menu.

Press and hold the Menu button for three seconds to access the advanced features of the meter.



Advanced Features Menu & Display Messages

The following table shows the functions and messages of the *Advanced Features* menu in the order they appear in the menu.

Display	Parameter	Action/Setting
F ILT	Filter	Set noise filter value
BYPASS	Bypass	Set filter bypass value
SERIAL	Serial	Set serial communication parameters
ADDR ES	Address	Set meter address
BAUD	Baud rate	Select baud rate
TR DELY	Transmit delay	Set transmit delay for serial communication
SELECT	Select	Enter the Select menu (function, cutoff, out)
FUNCTION	Math Function	Select linear, square root, programmable exponent, or round horizontal tank function
LINEAR	Linear	Set meter for linear function and select number of linearization points
NO PTS	Number of points	Set meter for 2 to 32-point linearization
SQRT	Square root	Set meter for square root extraction
PROG E	Programmable exponent	Set meter for programmable exponent and enter exponent value
RT	Round horizontal tank	Set meter for round horizontal tank volume calculation
DIAMETER	Diameter	Enter the tank's diameter in inches
LENGTH	Length	Enter the tank's length in inches
CUTOFF	Cutoff	Set low-flow cutoff
ROUTPR	Analog output programming	Program analog output parameters
SOURCE	Source	Select source for the 4-20 mA output
OVERRNG	Overrange	Program mA output for display overrange
UNDRNG	Underrange	Program mA output for display underrange
MAX	Maximum	Program maximum mA output allowed
MIN	Minimum	Program minimum mA output allowed

Display	Parameter	Action/Setting
CALIB	Calibrate	Calibrate 4-20 mA output (internal reference source used for scaling the output)
4 mA	4 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
20 mA	20 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
USER	User I/O	Assign function keys and digital I/O
F1	F1 function key	Assign F1 function key
F2	F2 function key	Assign F2 function key
F3	F3 function key	Assign F3 function key
LL 1	Logic level input 1	Assign logic level input 1 – 8, if expansion modules are connected
LL 0	Logic level output 1	Assign logic level output 1 – 8, if expansion modules are connected
ICAL	Internal source calibration	Enter internal source calibration (used for scaling the meter without a signal source)
C CAL	Current calibration	Calibrate 4-20 mA current input (internal reference source used for scaling the input)
C Lo	Current low	Calibrate low current input (e.g. 4 mA)
C Hi	Current high	Calibrate high current input (e.g. 20 mA)
V CAL	Voltage calibration	Calibrate voltage input
V Lo	Voltage low	Calibrate low voltage input (e.g. 0 V)
V Hi	Voltage high	Calibrate high voltage input (e.g. 10 V)
COPY	Copy	Enter copy function
SEND	Send	Send meter settings to another meter
DONE	Done	Copy function completed
DIAG	Diagnostics	Display parameter settings
INPUT	Input	Input selection
FUNCTION	Function	Function selected
SCALE	Scale	Scaling parameter
CUTOFF	Cutoff	Cutoff value

Display	Parameter	Action/Setting
<i>dSPLY</i>	<i>Display</i>	Display assignments
<i>rELAY</i>	<i>Relays</i>	Relay settings
<i>Rout</i>	<i>Analog output</i>	Analog output scaling
<i>RoutPr</i>	<i>Analog output programming</i>	Analog output programming
<i>SERIAL</i>	<i>Serial</i>	Serial communication settings
<i>LED t</i>	<i>LED test</i>	Test all LEDs
<i>Info</i>	<i>Information</i>	Display software and S/N information

Noise Filter (*FILTER*)

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level determines the length of time over which the signal is averaged. The filter level can be set between 2 and 199. The higher the filter level, the longer the averaging time and so the longer it takes the display to settle to its final value. Setting the filter level to zero disables the filter function.

Noise Filter Bypass (*BYPASS*)

The noise filter bypass changes the behavior of the meter so that small variations in the signal are filtered out but large abrupt changes in the input signal are displayed immediately. The bypass value determines the minimum amount of signal change to be displayed immediately. All signal changes smaller than the bypass value are filtered or averaged by the meter. The noise filter bypass may be set between 0.1 and 99.9% of full scale.

Serial Communications (SEr iAL)

The meter is equipped with serial communications capability as a standard feature using PDC Serial Communication Protocol.

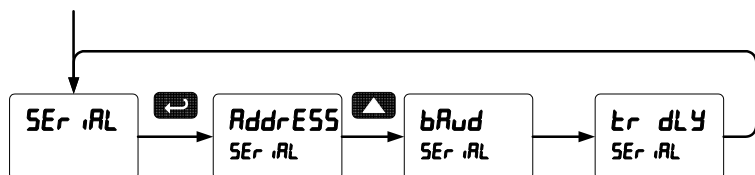
To communicate with a computer or other data terminal equipment, an RS-232 or RS-422/485 adapter option is required; see *Ordering Information* on page 3 for details.



Warning!

Do not connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the meter.

Note: More detailed instructions are provided with each optional serial communications adapter.

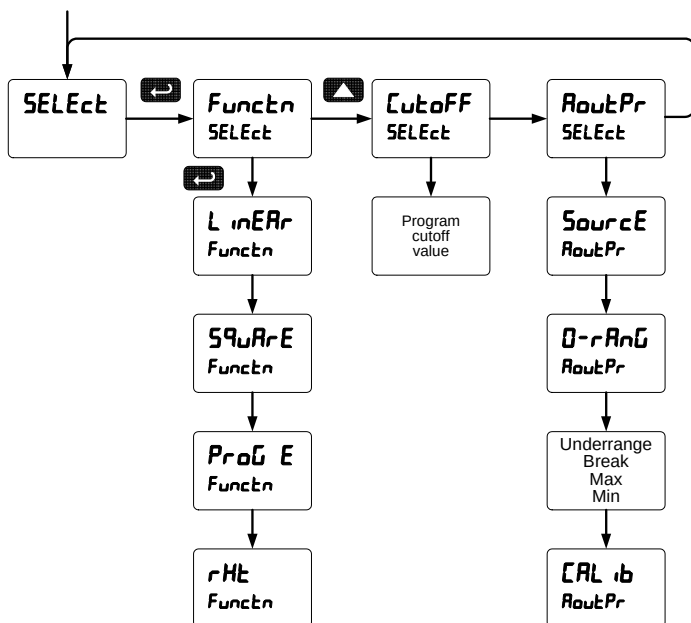


When using more than one meter in a multi-drop mode, each meter must be provided with its own unique address. The address may be programmed from 1 to 247. The transmit delay may be set between 0 and 199 ms.

The PD6000 can also be connected to another PD6000 allowing the user to copy all the settings from one meter to another, using the *Copy* function.

Select Menu (SELEct)

The *Select* menu is used to select the math function applied to the input (linear, square root, programmable exponent, or round horizontal tank), low-flow cutoff, and analog output programming. The multi-point linearization is part of the linear function selection.



Math Function Selection (Functn)

The *Function* menu is used to select the math function applied to the input: linear, square root, programmable exponent, or round horizontal tank volume calculation. The multi-point linearization is part of the linear function selection.

Meters are set up at the factory for linear function with 2-point linearization. The linear function provides a display that is linear with respect to the input signal.

Square Root Linearization (SQUR E)

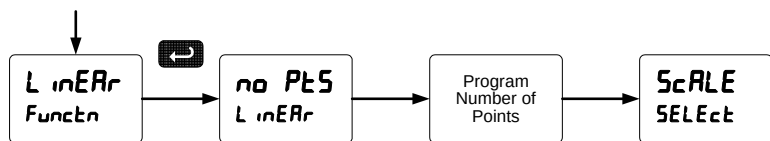
The square root function can be used to linearize the signal from a differential pressure transmitter and display flow rate in engineering units.

Programmable Exponent Linearization (PROG E)

The programmable exponent can be used to linearize the signal from level transmitters in open-channel flow applications using weirs and flumes.

Multi-Point Linearization (LEAR)

Meters are set up at the factory for linear function with 2-point linearization. Up to 32 linearization points can be selected under the linear function. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes with complex exponent.

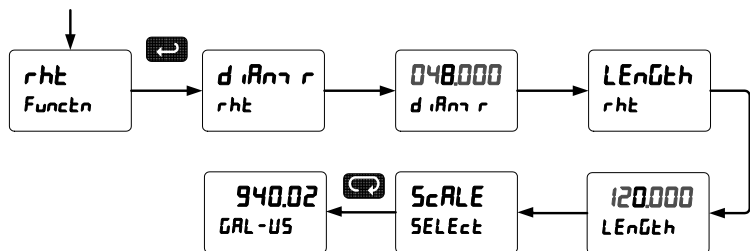


Round Horizontal Tank Linearization (RHT)

This function automatically calculates the volume in a round horizontal tank with flat ends.

Set the display for the desired decimal point and engineering units before entering the round horizontal tank function. Enter the diameter and the length in inches and the results are given in US gallons.

The meter can be scaled to display the volume in any engineering unit.



Low-Flow Cutoff (Cutoff)

The low-flow cutoff feature allows the meter to be programmed so that the often-unsteady output from a differential pressure transmitter, at low flow rates, always displays zero on the meter.

The cutoff value may be programmed from 0 to 999999. The meter will display zero below the cutoff value. Programming the cutoff value to zero disables the cutoff feature.

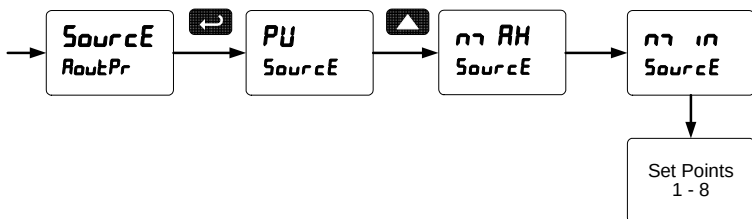
Analog Output Programming (RoutePr)

The *Analog Output Programming* menu is used to program the behavior of the 4-20 mA output. The following parameters and functions are programmed in this menu:

1. Source: Source for generating the 4-20 mA output (e.g. PV)
2. Overrange: Analog output value with display in overrange condition
3. Underrange: Analog output value with display in underrange condition
4. Break: Analog output value when loop break is detected
5. Max: Maximum analog output value allowed regardless of input
6. Min: Minimum analog output value allowed regardless of input
7. Calibrate: Calibrate the internal 4-20 mA source reference used to scale the 4-20 mA output

Analog Output Source

The source for generating the 4-20 mA output may be assigned to the process variable, maximum or minimum value reached by the process, or one of the set points.

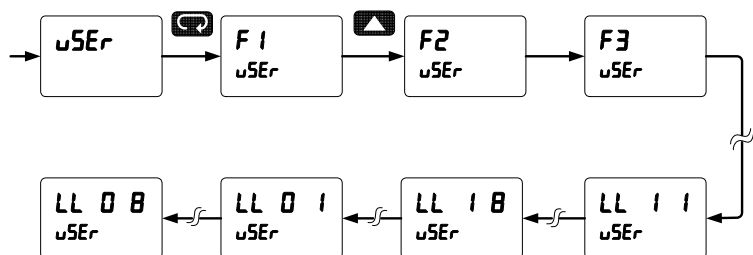


Analog Output Calibration

To perform the analog output calibration it is recommended to use a milliamp meter with a resolution of at least 0.1 μ A to measure the output current. The values saved internally during this procedure are used for scaling the 4-20 mA output in the *Setup* menu.

Programmable Function Keys User Menu (μSEr)

The *User* menu allows the user to assign the front panel function keys F1, F2, F3 and up to eight digital inputs to access most of the menus or to activate functions immediately (e.g. Reset max & min). Up to eight digital outputs can be assigned to a number of actions and functions executed by the meter (e.g. Alarms, relay acknowledgement, etc.).



Function Keys & Digital I/O Available Settings

Display	Description	Display	Description
ACK	Acknowledge relays	b 0 Lo	Min on big display
RESET	Reset menu	b 0 HL	Max/min big display
rSt Hi	Reset max	L 0 LE	Little display menu
rSt Lo	Reset min	L 0 Hi	Max on little display
rSt HL	Reset max & min	L 0 Lo	Min on little display
RELAY	Relay menu	L 0 HL	Max/min little display
SEt 1	Set point 1 - 8	d 5AbL	Disable function key
rLY d	Disable all relays	rr Enu	Menu button
rLY E	Enable all relays	r 0ht	Right arrow button
0 Hold	Relays output hold	uP	Up arrow button
dSPLY	Display menu	EntEr	Enter button
b 0	Big display menu	ALAr 1	Alarm 1 – 8
b 0 Hi	Max on big display		

Internal Source Calibration (ICAL)

The meter is factory calibrated prior to shipment to read in milliamps and volts depending on the input selection. The calibration equipment is certified to NIST standards.

The internal source allows the user to scale the meter without applying a signal.

The use of calibrated signal sources is necessary to perform the internal source calibration of the meter.

Check calibration of the meter at least every 12 months. Each input must be recalibrated separately.

Notes:

1. *If meter is in operation and it is intended to accept only one input type (e.g. 4-20 mA), recalibration of other input is not necessary.*
2. *Allow the meter to warm up for at least 15 minutes before performing the internal source calibration procedure.*

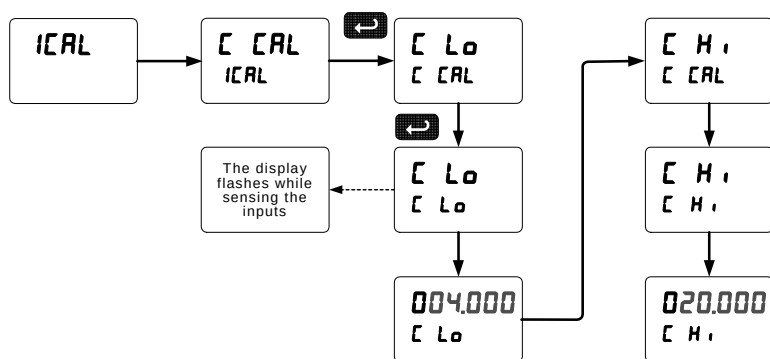
The *Internal calibration* menu is part of the *Advanced Features* menu.

1. Press and hold the Menu button for three seconds to access the advanced features of the meter.
2. Press the Up arrow button to scroll to the *Internal calibration* menu (ICAL) and press Enter.
3. The meter displays either current calibration (ICAL) or voltage calibration (VICAL), according to the input setup. Press Enter to start the calibration process.

Example of *Internal Calibration* for current input:

4. The meter displays *low* input current message (⌈ Lo). Apply the low input signal and press Enter. The display flashes for a moment while the meter is accepting the low input signal.
5. After the display stops flashing, a number is displayed with the leftmost digit brighter than the rest. The bright digit is the active digit that can be changed by pressing the Up arrow button. Press the Right arrow button to move to the next digit.
6. Set the display value to correspond to the input signal being calibrated, typically 4.000 mA.
7. The display moves to the *high* input calibration (⌈ Hi). Apply the high input signal and press Enter.
8. Set the display for the high input calibration, in the same way as it was set for the low input calibration, typically 20.000 mA.

For instructions on how to program numeric values see *Setting Numeric Values*, page 30.



The graphic above shows the calibration of the current input. The voltage input is calibrated in a similar way.

Tips:

- Low and high input signals can be any valid values within the range of the meter.
- Observe minimum input span requirements between input 1 and input 2.
- Low input should be less than high input signal.

Error Message (Error)

An error message indicates that the calibration or scaling process was not successful.

After the error message is displayed, the meter reverts to input 2 during calibration or scaling and to input 1 during internal calibration, allowing the appropriate input signal to be applied or programmed.

The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals, or it is connected backwards.
2. Wrong signal selection in *Setup* menu.
3. Minimum input span requirements not maintained.

Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter.

Input Range	Input 1 & Input 2 Span
4-20 mA	0.15 mA
±10 VDC	0.10 VDC

Meter Copy Function (COPY)

The *Copy* function is used to copy (or clone) all the settings from one meter to other meters requiring exactly the same setup and programming (*i.e.* type of input, scaling, decimal point, filter, bypass, etc.).



Warning!

Only the PDA1200 meter copy cable must be used for meter-to-meter interfacing. The PDA1200 is a special eight-conductor flat cable with two wires swapped.

Using standard CAT5 or other cable will cause damage to both meters.

PDA1200 Meter Copy Cable



Figure 18. Meter Copy Connection

Copy Function Requirements

To successfully copy settings from one meter to another, both meters must have:

1. Same software version
2. Same baud rate setting

See *Determining Software Version*, page 76 for instructions.

Meter Copy or Cloning Instructions

**Caution!**

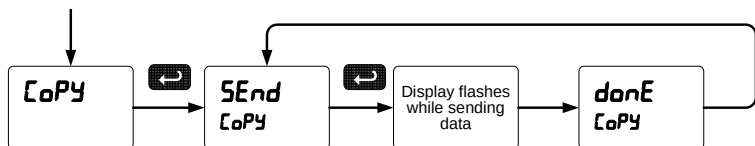
Do not connect the two meters to the same signal source while cloning. Internal calibration may be affected.

1. Connect two meters using a PDA1200 meter copy cable.

**Warning!**

Using standard CAT5 or other cable will cause damage to both meters. Use PDA1200 meter copy cable only.

2. Do not connect the two meters to the same signal source.
3. Power up both meters. Leave Clone meter in Run Mode.
4. Enter the *Advanced Features* menu of the Master meter; see *Advanced Features Menu* on page 60.
5. Scroll to the *Copy* function using the Up arrow button then press Enter.
6. The meter displays the message *SEnd*. Press Enter, the display flashes while sending data. The message *done* is displayed when copying is completed.



7. The Clone meter displays the message *COPY rE* while being programmed then the message *done* when copying is completed. The meter initializes and returns to Run Mode using the same settings as the Master.
8. If meter to be cloned does not respond to the data being sent, refer to **Copy Function Requirements** above.

METER OPERATION

The meter is capable of accepting current (0-20 mA, 4-20 mA) and voltage signals (0-5 V, 1-5 V, 0-10 V, ± 10 V) and displaying these signals in engineering units from -99999 to 999999 (e.g. a 4-20 mA signal could be displayed as -50.000 to 50.000).

The dual-line display can be customized by the user to operate in such a way as to satisfy a specific application. Typically the main display is used for the process variable; while the second display is used engineering units, custom legend, or set point indication.

Front Panel Buttons Operation

Button Symbol	Description
	Press to enter or exit Programming Mode, view settings, or exit max/min readings
	Press to reset max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to display max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to acknowledge relays or other parameters/function assigned through the <i>User</i> menu

Function Keys Operation

During operation, the programmable function keys operate according to the way they have been programmed in the *Advanced Features – User* menu.

The table above shows the factory default settings for F1, F2, and F3.

Maximum/Minimum Readings

The max & min readings (peak & valley) reached by the process can be displayed either continuously or momentary:

1. Display briefly by assigning to the F1-F3 function keys or to the digital inputs in the *User* menu.
2. Display continuously by assigning either display to max/min through the *Display* menu.

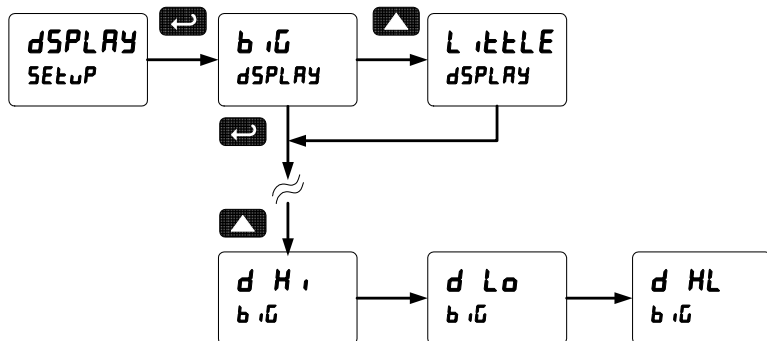
Any of the F1-F3 function keys (buttons) and the digital inputs can be programmed to reset the max & min readings. The meters are set at the factory to display the max reading by pressing the Up arrow/F2 button and to use the Right arrow/F1 button to access the *Reset* menu.

To display max reading using function key with factory defaults:

1. Press Up arrow/F2 button to display maximum reading since the last reset/power-up.
2. To reset max/min press Right arrow/F1 button to access the Reset menu. The max & min displays are reset to actual values.
3. Press Menu to exit max/min display reading.

To display max/min readings continuously:

Assign either display to Max (d H i), Min (d L o), or toggle between Max and Min (d HL b iG) every 10 seconds.



TROUBLESHOOTING

The rugged design and the user-friendly interface of the meter should make it unusual for the installer or operator to refer to this section of the manual. However, due to the many features and functions of the meter, it's possible that the setup of the meter does not agree with what an operator expects to see.

If the meter is not working as expected, refer to the *Diagnostics* menu and recommendations below.

Diagnostics Menu (d iAG)

The *Diagnostics* menu is located in the *Advanced Features* menu, to access *Diagnostics* menu see *Advanced Features Menu*, page 60.

It provides an easy way to view the programmed parameter settings for troubleshooting purposes. Press the Enter button to view the settings and the Menu button to exit at any time.

For a description of the diagnostic messages, see *Advanced Features Menu & Display Messages*, page 61.

Determining Software Version

To determine the software version of a meter:

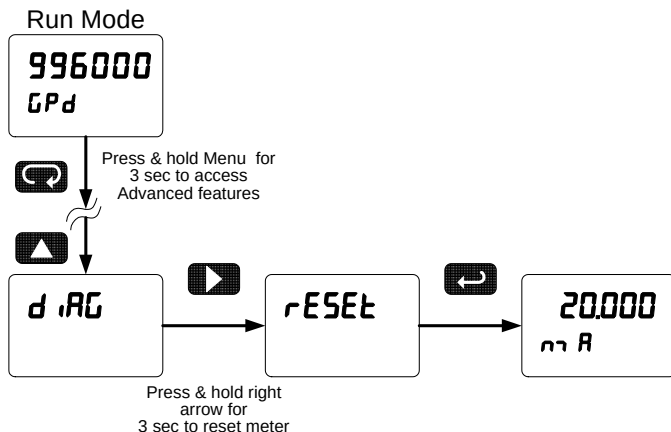
1. Go to the *Diagnostics* menu (d iAG) and press Enter button.
2. Press Up arrow button and scroll to Information menu (InF0).
3. Press Enter to access the software number (5Ft), version (UEr), and serial number (5n) information. Write down the information as it is displayed. Continue pressing Enter until all the information is displayed.
4. The meter returns to Run Mode after displaying all the settings.

Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what's happening, it might be better to start the setup process from the factory defaults.

Instructions to load factory defaults:

1. Enter the *Advanced Features* menu. See *Advanced Features Menu*, page 60.
2. Press Up arrow to go to *Diagnostics* menu
3. Press and hold Right arrow for five seconds, press Enter when display flashes *rESEt*.
Note: If Enter is not pressed within three seconds, the display returns to the *Diagnostics* menu.
4. The meter goes through an initialization sequence (similar as on power-up), and loads the factory default settings.



Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user may record the new setting for the particular application.

Model: _____ S/N: _____ Date: _____

Parameter	Display	Default Setting	User Setting
Input type	<i>inPut</i>	4-20 mA	
Filter	<i>FILTEr</i>	10	
Bypass	<i>bYPASS</i>	0.2	
Function	<i>FunctiOn</i>	Linear	
Number of points	<i>no Pts</i>	2	
Programming	<i>ProG</i>	Scale	
Input 1	<i>inP 1</i>	4.000 mA	
Display 1	<i>d iS 1</i>	4.000	
Input 2	<i>inP 2</i>	20.000 mA	
Display 2	<i>d iS 2</i>	20.000	
Decimal point	<i>dddddd</i>	3 places	
Cutoff value	<i>CutOFF</i>	0.000 (disabled)	
Display assignment	<i>dSPLaY</i>		
Big display (Main)	<i>b iG</i>	PV: Process variable	
Little display (Small)	<i>L iTELE</i>	Eng units: mA	
Display intensity	<i>d- iNtY</i>	6	
Relay 1 action	<i>Act 1</i>	Automatic	
Relay 1 set point	<i>SEt 1</i>	1.000	
Relay 1 reset point	<i>rSEt 1</i>	0.500	
Relay 2 action	<i>Act 2</i>	Automatic	
Relay 2 set point	<i>SEt 2</i>	2.000	
Relay 2 reset point	<i>rSEt 2</i>	1.500	
Relay 3 action	<i>Act 3</i>	Automatic	
Relay 3 set point	<i>SEt 3</i>	3.000	
Relay 3 reset point	<i>rSEt 3</i>	2.500	

Parameter	Display	Default Setting	User Setting
Relay 4 action	Act 4	Automatic	
Relay 4 set point	SEt 4	4.000	
Relay 4 reset point	rSEt 4	3.500	
Fail-safe relay 1	FLS 1	Off	
Fail-safe relay 2	FLS 2	Off	
Fail-safe relay 3	FLS 3	Off	
Fail-safe relay 4	FLS 4	Off	
On delay relay 1	On 1	0.0 sec	
Off delay relay 1	OFF 1	0.0 sec	
On delay relay 2	On 2	0.0 sec	
Off delay relay 2	OFF 2	0.0 sec	
On delay relay 3	On 3	0.0 sec	
Off delay relay 3	OFF 3	0.0 sec	
On delay relay 4	On 4	0.0 sec	
Off delay relay 4	OFF 4	0.0 sec	
Loop break relay 1	Ignore	Ignore	
Loop break relay 2	Ignore	Ignore	
Loop break relay 3	Ignore	Ignore	
Loop break relay 4	Ignore	Ignore	
Display 1 analog out	d1S 1	4.000	
Output 1 value	Out 1	4.000 mA	
Display 2 analog out	d1S 2	20.000	
Output 2 value	Out 2	20.000 mA	
Source analog output	Source	Process Variable	
Overrange output	OverRange	21.000 mA	
Underrange output	UnderRange	3.000 mA	
Loop break output	brERR	1.000 mA	
Maximum output	Hi RH	23.000 mA	
Minimum output	Lo RH	0.000 mA	

Model PD6000 Analog Input Process Meter Instruction Manual

Parameter	Display	Default Setting	User Setting
Serial address	<i>Addr</i> E5	001	
Baud rate	<i>bAud</i>	2400	
Transmit delay	<i>tr dLy</i>	10 ms	
F1 function key	<i>F1</i>	Reset max & min	
F2 function key	<i>F2</i>	Big display: Max (Hi)	
F3 function key	<i>F3</i>	Acknowledge relays	
Logic level input 1	<i>LL 1 1</i>	Menu	
Logic level input 2	<i>LL 1 2</i>	Right arrow	
Logic level input 3	<i>LL 1 3</i>	Up arrow	
Logic level input 4	<i>LL 1 4</i>	Enter	
Logic level output 1	<i>LL 0 1</i>	Disabled	
Logic level output 2	<i>LL 0 2</i>	Disabled	
Logic level output 3	<i>LL 0 3</i>	Disabled	
Logic level output 4	<i>LL 0 4</i>	Disabled	
Password 1	<i>PASS 1</i>	000000 (unlocked)	
Password 2	<i>PASS 2</i>	000000 (unlocked)	
Password 3	<i>PASS 3</i>	000000 (unlocked)	

Troubleshooting Tips

Symptom	Check/Action
No display at all	Check power at power connector
Not able to change setup or programming, <i>Locd</i> is displayed	Meter is password-protected, enter correct six-digit password to unlock
Meter displays error message during calibration (<i>Error</i>)	Check: 1. Signal connections 2. Input selected in <i>Setup</i> menu 3. Minimum input span requirements
Meter displays 1. <i>999999</i> 2. <i>-99999</i>	Check: 1. Input selected in <i>Setup</i> menu 2. Corresponding signal at Signal connector
Display is unstable	Check: 1. Input signal stability and value 2. Display scaling vs. input signal 3. Filter and bypass values (increase)
Display response is too slow	Check filter and bypass values
Display reading is not accurate	Check: 1. Math function selected: Linear, square root, etc. 2. Scaling or calibration
Display does not respond to input changes, reading a fixed number	Check: 1. Display assignment, it might be displaying max, min, or set point.
Display alternates between 1. <i>H</i> and a number 2. <i>Lo</i> and a number	Press Menu to exit max/min display readings.
Relay operation is reversed	Check: 1. Fail-safe in <i>Setup</i> menu 2. Wiring of relay contacts
Relay and status LED do not respond to signal	Check: 1. Relay action in <i>Setup</i> menu 2. Set and reset points
Meter not communicating with application programs	Check: 1. Serial adapter and cable 2. Serial settings 3. Meter address and baud rate
If the display locks up or the meter does not respond at all	Cycle the power to reboot the microprocessor.
Other symptoms not described above	Call Technical Support for assistance.

Alphabetical List of Display Functions & Messages

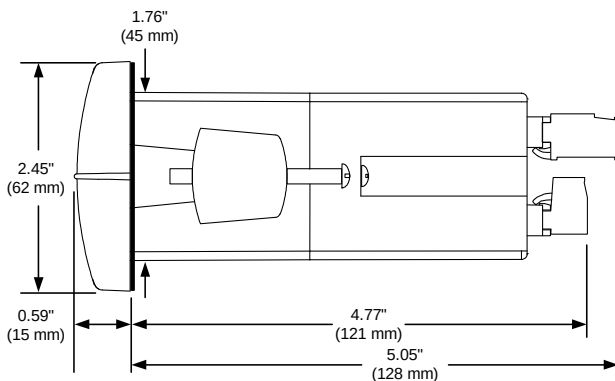
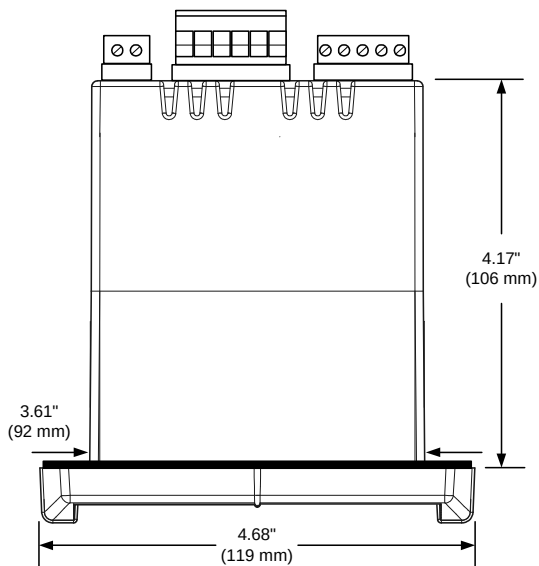
Display	Parameter	Action/Setting Description
20 mA	20 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
4 mA	4 mA output	Enter mA output value read by milliamp meter with at least 0.001 mA resolution
999999 -999999	Flashing display	Overrange condition Underrange condition
ACK	Acknowledge	Acknowledge relays
Act 1	Action 1	Set relay 1 action
Address	Address	Set meter address
ALARM 1	Alarm 1	Assign digital output to Alarm 1-8
ALTERN	Alternate	Set relay for pump alternation control
Auto-manual	Auto-manual	Set relay for automatic & manual reset
Analog	Analog output	Enter the Analog output scaling menu
Analog Pr	Analog output programming	Enter analog output programming
Auto	Automatic	Press Enter to set automatic operation
Baud	Baud rate	Select baud rate
Big	Big display	Press Enter to assign the main display parameter (default: PV)
Big HI	Max on big display	Assign digital input to display max on the main display
Big HL	Max/min big display	Assign digital input to toggle max/min on the main display
Big Lo	Min on big display	Assign digital input to display min on the main display
brk	Loop break	Set relay condition if loop break detected
bypass	Bypass	Set filter bypass value
Cal	Current calibration	Calibrate 4-20 mA current input (internal reference source used for scaling the input)
Cal HI	Current high	Calibrate high current input (e.g. 20 mA)
Cal Lo	Current low	Calibrate low current input (e.g. 4 mA)

Display	Parameter	Action/Setting Description
Cal	<i>Calibrate</i>	Enter the <i>Calibration</i> menu
Cal 0	<i>Calibrate</i>	Calibrate 4-20 mA output (internal reference source used for scaling the output)
Control	<i>Control</i>	Enter <i>Control</i> menu to turn relays on/off, set analog output manually, or return meter to automatic operation
Copy	<i>Copy</i>	Enter copy function
Cutoff	<i>Cutoff</i>	Set low-flow cutoff
Dec Pt	<i>Decimal point</i>	Set decimal point
Delay	<i>Delay</i>	Enter relay <i>Time Delay</i> menu
diag	<i>Diagnostics</i>	Display parameter settings
dia r	<i>Diameter</i>	Enter the tank's diameter in inches
dis Int	<i>Display intensity</i>	Set display intensity level from 1 to 8
dis 1	<i>Display 1</i>	Program display 1 value
dis 2	<i>Display 2</i>	Program display 2 value (up to 32 points)
disabl	<i>Disable</i>	Disable function key
delay 1	<i>Delay 1</i>	Enter relay 1 time delay setup (1-8)
done	<i>Done</i>	Copy function completed
display	<i>Display</i>	Enter the <i>Display</i> menu
Enter	Enter button	Assign digital input to Enter button
Error	<i>Error</i>	Error, calibration not successful, check signal or programmed value
F1	<i>F1 function key</i>	Assign F1 function key
F2	<i>F2 function key</i>	Assign F2 function key
F3	<i>F3 function key</i>	Assign F3 function key
fail SF	<i>Fail-safe</i>	Enter <i>Fail-safe</i> menu
filter	<i>Filter</i>	Set noise filter value
FLS 1	<i>Fail-safe 1</i>	Set relay 1 fail-safe operation (1-8)

Display	Parameter	Action/Setting Description
<i>Force</i>	<i>Force</i>	Force analog output value for loop break
<i>Function</i>	<i>Math Function</i>	Select linear, square root, programmable exponent, or round horizontal tank function
<i>ICAL</i>	<i>Internal source calibration</i>	Enter internal source calibration (used for scaling the meter without a signal source)
<i>Ignore</i>	<i>Ignore</i>	Ignore loop break condition
<i>Info</i>	<i>Information</i>	Display software and S/N information
<i>INP 1</i>	<i>Input 1</i>	Calibrate input 1 signal or program input 1 value
<i>INP 2</i>	<i>Input 2</i>	Calibrate input 2 signal or program input 2 value (up to 32 points)
<i>input</i>	<i>Input</i>	Enter <i>Input</i> selection menu
<i>LATCH</i>	<i>Latching</i>	Set relay for latching operation
<i>LED t</i>	<i>LED test</i>	Test all LEDs
<i>LENGTH</i>	<i>Length</i>	Enter the tank's length in inches
<i>LINEAR</i>	<i>Linear</i>	Set meter for linear function and select number of linearization points
<i>Lt Hl</i>	Max on little display	Assign digital input to display max on the small display
<i>Lt HL</i>	Max/min little display	Assign digital input to toggle max/min on the small display
<i>Lt Lo</i>	Min on little display	Assign digital input to display min on the small display
<i>LtLE</i>	<i>Little display</i>	Press Enter to assign the small display parameter (default: engineering units)
<i>LL 1 1</i>	<i>Logic level input 1</i>	Assign logic level input 1 – 8, if expansion modules are connected
<i>LL 0 1</i>	<i>Logic level output 1</i>	Assign logic level output 1 – 8, if expansion modules are connected
<i>Locked</i>	<i>Locked</i>	Enter password to unlock meter
<i>Lt-Clear</i>	<i>Latching-cleared</i>	Set relay for latching operation with manual reset only after alarm condition has cleared
<i>mA</i>	<i>4-20 mA</i>	Set meter for 4-20 mA input

Display	Parameter	Action/Setting Description
MAN	<i>Manual</i>	Press Enter to manually control relays or analog output operation
MAX	<i>Maximum</i>	Program maximum mA output allowed
MEN	Menu button	Assign digital input to Menu button
MIN	<i>Minimum</i>	Program minimum mA output allowed
PTS	<i>Number of points</i>	Set meter for 2 to 32-point linearization
HOLD	Relays output hold	Assign digital input to hold all relays state
OFF	<i>Off</i>	Disable relay and front panel status LED, turn relays off, program off time delay
OFF 1	<i>Off 1</i>	Set relay 1 Off time delay (1-8)
ON	<i>On</i>	Enable fail-safe operation, turn relays on, program on time delay
ON 1	<i>On 1</i>	Set relay 1 On time delay (1-8)
OVER	<i>Overrange</i>	Program mA output for display overrange
OUT 1	<i>Output 1</i>	Program output 1 value (e.g. 4.000 mA)
OUT 2	<i>Output 2</i>	Program output 2 value (e.g. 20.000 mA)
PASS	<i>Password</i>	Enter the <i>Password</i> menu
PASS 1	<i>Password 1</i>	Set or enter Password 1 (Allows use of the F1–F3 function keys)
PASS 2	<i>Password 2</i>	Set or enter Password 2 (Allows use of the F1–F3 function keys and changing the set/reset points)
PASS 3	<i>Password 3</i>	Set or enter Password 3 (Restricts all programming & F1–F3 keys)
PROG	<i>Program</i>	Enter the <i>Program</i> menu
PROG E	<i>Programmable exponent</i>	Set meter for programmable exponent and enter exponent value
RELAY	<i>Relay</i>	Enter the <i>Relay</i> menu
RESET	<i>Reset</i>	Press Enter to access the <i>Reset</i> menu
RT	<i>Round horizontal tank</i>	Set meter for round horizontal tank volume calculation

Display	Parameter	Action/Setting Description
$\rightarrow$ Right	Right arrow	Assign digital input to Right arrow button
REL 1	Relay 1	Relay 1 setup (1-8)
REL d	Disable relay	Assign digital input to disable all relays
REL E	Enable relay	Assign digital input to enable all relays
RES 1	Reset 1	Program reset point 1 (1-8)
RES H	Reset high	Press Enter to reset max display
RES HL	Reset high & low	Press Enter to reset max & min displays
RES Lo	Reset low	Press Enter to reset min display
SAMP PL	Sampling	Set relay for sampling operation
SCALE	Scale	Enter the Scale menu
SELECT	Select	Enter Select menu (function, cutoff, output programming)
SEND	Send	Send meter settings to another meter
SERIAL	Serial	Set serial communication parameters
SET 1	Set 1	Program set point 1 (1-8)
SETUP	Setup	Enter Setup menu
SOURCE	Source	Select source for the 4-20 mA output
SQRT	Square root	Set meter for square root extraction
TR DELAY	Transmit delay	Set transmit delay for serial communication
UNLOC	Unlocked	Program password to lock meter
UP	Up arrow	Assign digital input to Up arrow button
UNDERRNG	Underrange	Program mA output for display underrange
USER	User I/O	Assign function keys and digital I/O
V CAL	Voltage calibration	Calibrate voltage input
V H	Voltage high	Calibrate high voltage input (e.g. 10 V)
V Lo	Voltage low	Calibrate low voltage input (e.g. 0 V)
VOLT	0-10 VDC	Set meter for ± 10 VDC input

MOUNTING DIMENSIONS**Figure 19. Meter Dimensions - Side View****Figure 20. Meter Dimensions - Top View**

How to Contact Precision Digital

- For Technical Support please
Call: (800) 610-5239 or (508) 655-7300
Fax: (508) 655-8990
Email: support@predig.com
- For Sales Support or to place an order please
contact your local distributor or
Call: (800) 343-1001 or (508) 655-7300
Fax: (508) 655-8990
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GRUNDFOS®

Company name: Advanced Fluid Technologies

Created by: Matt Rankins

Phone: 501-835-3200

Fax: 501-835-3251

Date: 03/01/2009

Project: -

Reference number: -

Client: -

Client number: -

Contact: -

Position	Count	Description	Unit price
	1	25S10-7 Product No.: 05010007 Multi-stage submersible pump for raw water supply, groundwater lowering and pressure boosting. The pump is suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibers. The pump is made entirely of Stainless steel DIN W.-Nr. DIN W.-Nr. 1.4301 and suitable for horizontal and vertical installation. The pump is fitted with a built-in non-return valve. Liquid: Maximum liquid temperature: 104 °F Liquid temp: 68 °F Density: 62.29 lb/ft³ Technical: Speed for pump data: 3450 rpm Rated flow: 26.42 US gpm Rated head: 138 ft Curve tolerance: ISO 9906 Annex A Materials: Pump: Stainless steel DIN W.-Nr. 1.4301 AISI 304 Impeller: Stainless steel DIN W.-Nr. 1.4301 AISI 304 Installation: Pump outlet: 1 1/2" NPT Motor diameter: 4 inch Electrical data: Power (P2) required by pump: 1.462 HP Start. method: direct-on-line	On request

GRUNDFOS®

Company name: Advanced Fluid Technologies
Created by: Matt Rankins
Phone: 501-835-3200
Fax: 501-835-3251
Date: 03/01/2009

Project: -
Reference number: -

Client: -
Client number: -
Contact: -

Position	Count	Description	Unit price
	1	25S10-7  Product photo could vary from the actual product Product No.: 05010007 Multi-stage submersible pump for raw water supply, groundwater lowering and pressure boosting. The pump is suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibers. The pump is made entirely of Stainless steel DIN W.-Nr. DIN W.-Nr. 1.4301 and suitable for horizontal and vertical installation. The pump is fitted with a built-in non-return valve. Liquid: Maximum liquid temperature: 104 °F Liquid temp: 68 °F Density: 62.29 lb/ft³ Technical: Speed for pump data: 3450 rpm Rated flow: 26.42 US gpm Rated head: 138 ft Curve tolerance: ISO 9906 Annex A Materials: Pump: Stainless steel DIN W.-Nr. 1.4301 AISI 304 Impeller: Stainless steel DIN W.-Nr. 1.4301 AISI 304 Installation: Pump outlet: 1 1/2" NPT Motor diameter: 4 inch Electrical data:	On request

Company name: Advanced Fluid Technologies
Created by: Matt Rankins
Phone: 501-835-3200
Fax: 501-835-3251
Date: 03/01/2009

Project: -
Reference number: -

Client: -
Client number: -
Contact: -

Position	Count	Description	Unit price
		Power (P2) required by pump: 1.462 HP Start. method: direct-on-line	

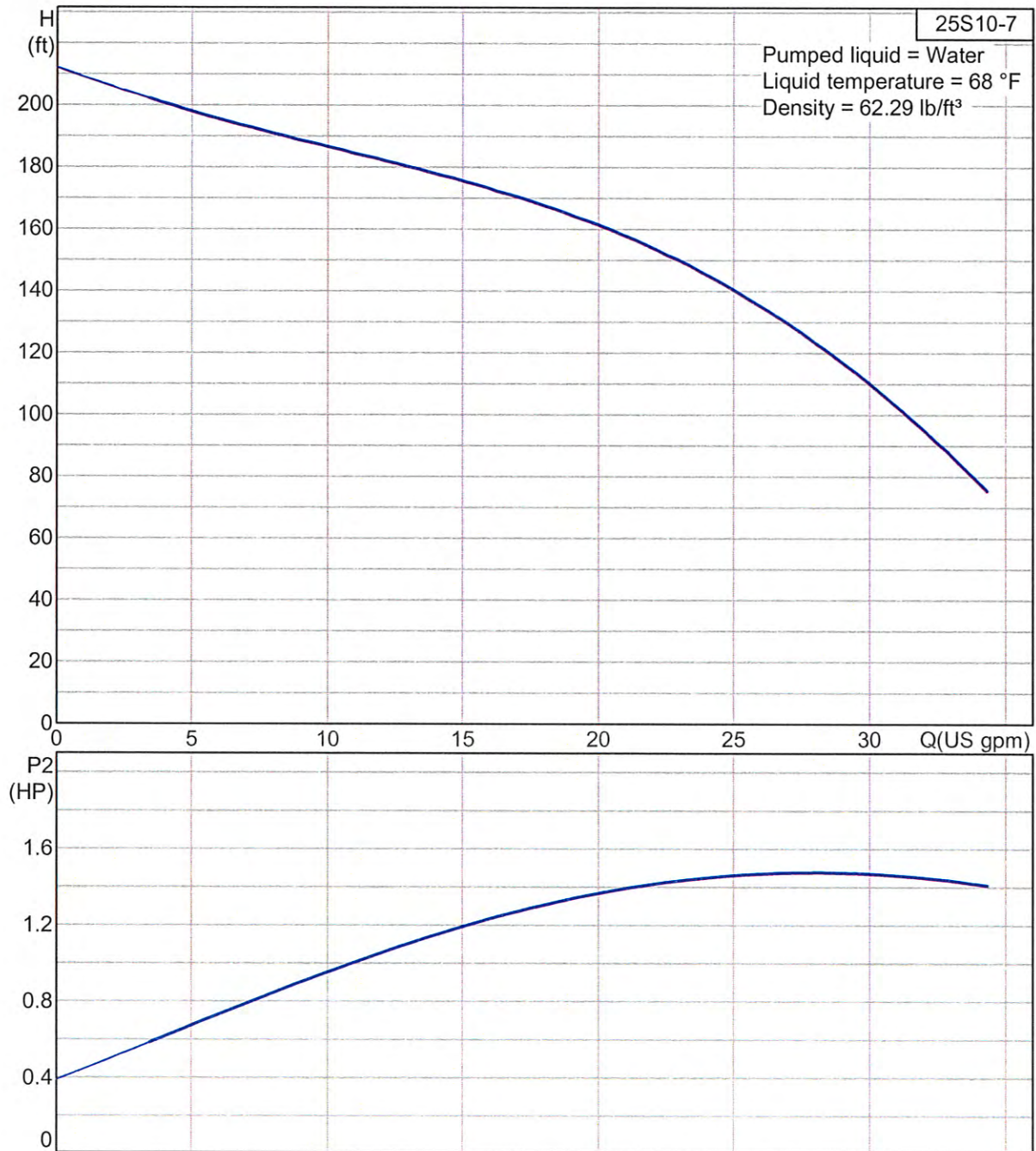


Company name: Advanced Fluid Technologies
Created by: Matt Rankins
Phone: 501-835-3200
Fax: 501-835-3251
Date: 03/01/2009

Project: -
Reference number: -

Client: -
Client number: -
Contact: -

05010007 25S10-7 60 Hz



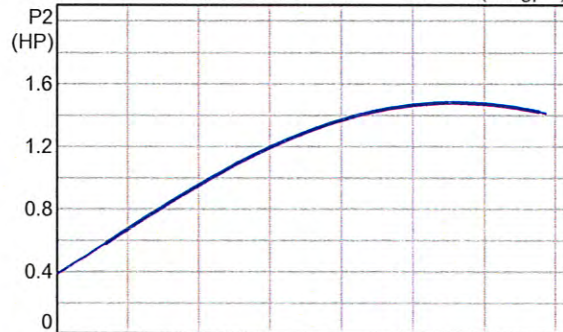
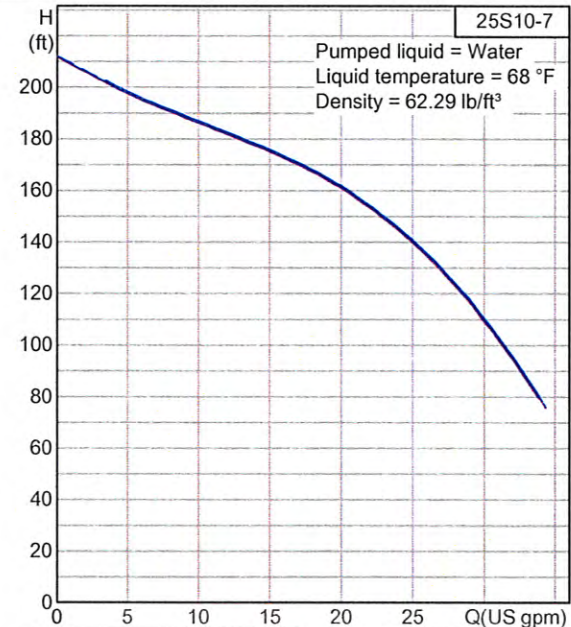


Company name: Advanced Fluid Technologies
Created by: Matt Rankins
Phone: 501-835-3200
Fax: 501-835-3251
Date: 03/01/2009

Project: -
Reference number: -

Client: -
Client number: -
Contact: -

Description	Value
Product name:	25S10-7
Product No.:	05010007
EAN:	5700390229641
Technical:	
Speed for pump data:	3450 rpm
Rated flow:	26.42 US gpm
Flow range:	3.43 .. 34 US gpm
Max flow:	34 US gpm
Rated head:	138 ft
Curve tolerance:	ISO 9906 Annex A
Stages:	7
Model:	B
Valve:	pump with built-in non-return valve
Materials:	
Pump:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Impeller:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Installation:	
Pump outlet:	1 1/2" NPT
Motor diameter:	4 inch
Liquid:	
Maximum liquid temperature:	104 °F
Liquid temp:	68 °F
Density:	62.29 lb/ft³
Electrical data:	
Applic. motor:	GRUNDFOS
Power (P2) required by pump:	1.462 HP
Start. method:	direct-on-line
Others:	
Sales region:	Namreg



GRUNDFOS®

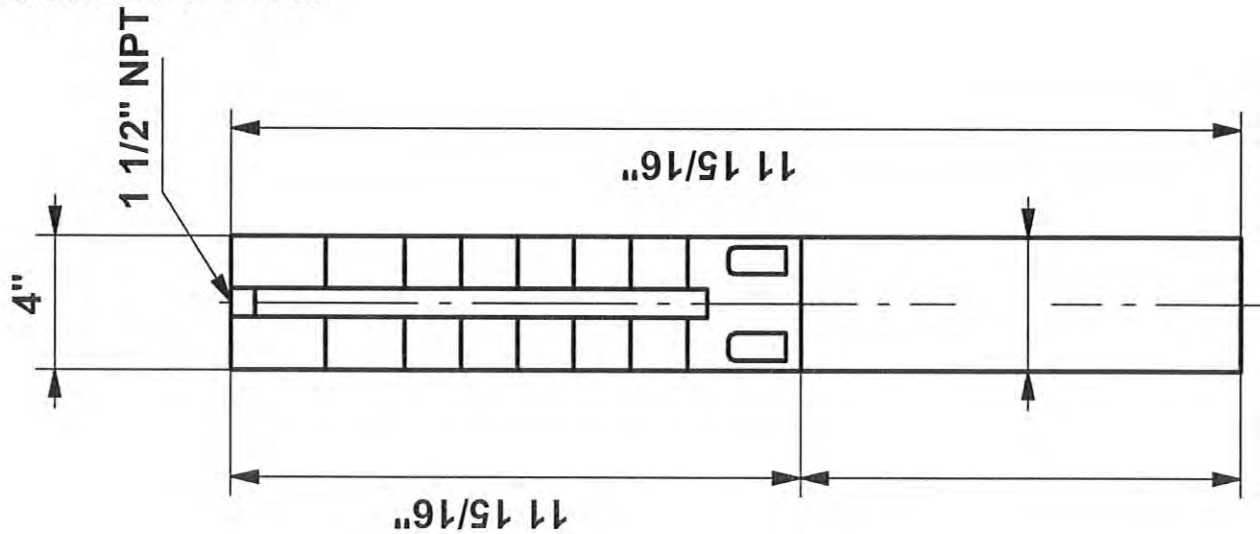


Company name: Advanced Fluid Technologies
Created by: Matt Rankins
Phone: 501-835-3200
Fax: 501-835-3251
Date: 03/01/2009

Project: -
Reference number: -

Client: -
Client number: -
Contact: -

05010007 25S10-7 60 Hz



Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

DriscoPlex[®] PE3608 / (PE3408) Pipe Pipe and Fittings Data Sheet

Typical Material Physical Properties of DriscoPlex[®] PE3608 / (PE3408)

High Density Polyethylene Materials

Property	Unit	Test Procedure	Typical Value
Material Designation	---	PPI TR-4	PE3608
Cell Classification	---	ASTM D3350	345464C
Pipe Properties			
Density	gms / cm ³	ASTM D1505	0.955 (black)
Melt Index Condition 190 / 2.16	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1600
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	800
Color: UV Stabilizer [C] [E]	---	ASTM D3350	Min 2% carbon Black Color UV Stabilizer
Material Properties			
Flexural Modulus 2% Secant - 16:1 span; depth, 0.5 in / min	psi	ASTM D790	>110,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	3200
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>700
Elastic Modulus	psi	ASTM D638	>150,000
Hardness	Shore D	ASTM D2240	62
PENT	hrs	ASTM F1473	>100
Thermal Properties			
Vicat Softening Temperature	°F	ASTM D1525	256
Brittleness Temperature	°F	ASTM D746	-103
Thermal Expansion	in / in / °F	ASTM D696	1.0 x 10 ⁻⁴

SUGGESTED INDUSTRIES AND APPLICATIONS

<u>Potable Water Mains</u>	<u>Horizontal Directional Drilling (HDD)</u>	<u>Marine Service</u>
<u>Sliplining</u>	<u>Water transmission Lines</u>	<u>Pipe Bursting</u>
<u>Industrial Water Mains</u>	<u>Ash, Tailings & Abrasives</u>	<u>Mining</u>
<u>Municipal Water Utilities</u>	<u>Open-cut and Bury</u>	<u>Culverts</u>
<u>Rural Water Distribution</u>	<u>River Crossings</u>	<u>Plow-in</u>
<u>Mun. & Ind. Sewer</u>	<u>Trenchless Technologies</u>	<u>Crude oil</u>
<u>Fire Main Piping</u>	<u>Rural Water Distribution</u>	<u>Plow-in</u>

Butt Fusion Conditions

- 60-90 psig (4.14-6.21 bar) interfacial fusion pressure.
- 400-450° (204-232°C) heater surface temperature range.
- Please refer to Performance Pipe's PE3608 (PE3408) fusion procedure, Bulletin PP 750.

Available Sizes

- ¾" through 54" IPS
- 4" through 36" DIPS

Specification Data

The resin, pipe and fitting listed may comply with one or more of the standards below.

<u>Applicable Standards</u>	<u>DriscoPlex® Pipe Series</u>	<u>PE3608 (PE3408)</u>	<u>PE4710 (d_f)</u>
<u>ASTM F714, NSF 61, ASTM D3035</u>	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
<u>AWWA C906, AWWA C901</u>	4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700	0.5	0.63
<u>FMA, AWWA, F714</u>	1500, 1600	0.5	---
<u>API 15LE, ASTM D2513</u>	6400	0.5	0.63

For more information and technical assistance contact:

Performance Pipe, a division of
Chevron Phillips Chemical Company LP
P.O. Box 269006
Plano, TX 75026-9006
800.527.0662



Bulletin: PP 109

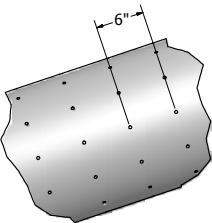
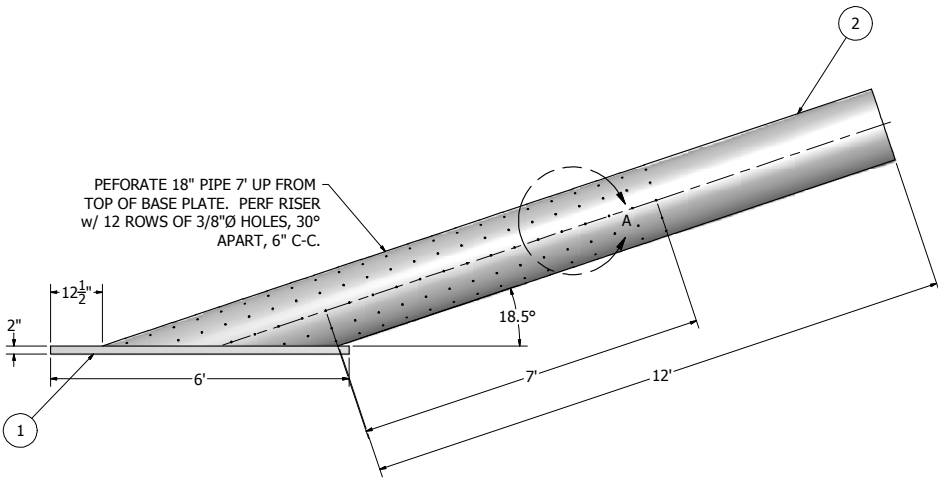
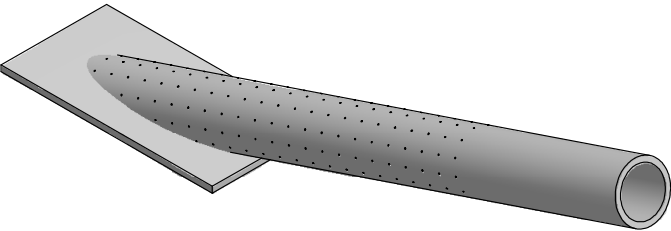
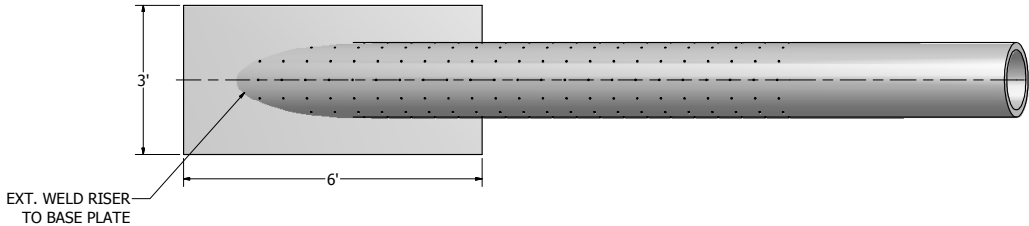
Revision Date September, 2006

Another quality product from

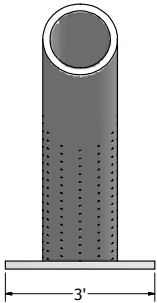


Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	18 sq ft	29020010	BASE PLATE 3' x 6' FROM 2" HDPE SHEET
2	17 ft	10181116	18" DR 11 HDPE PIPE



DETAIL A



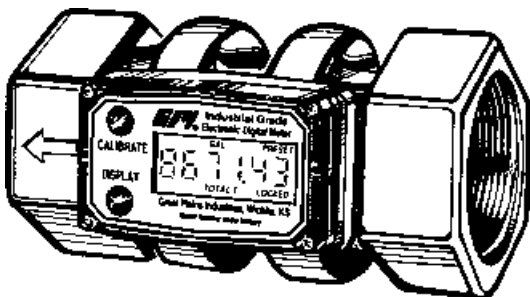
		CUSTOMER NAME:	
		ADVANCE FLUID TECH	
DRAWN		DATE	
N/A		2/9/2009	
SALESMAN		SCALE	
JIMMY BAUCH		D	
ORDER #		FILE LOCATION	
		DF/JBAUCH/ADVANCE-18 SUMP RISER-020908	
		REV	
		1	

APPROVED BY: _____ DATE _____

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Industrial Grade **09 COMPUTER ELECTRONICS** Owner's Manual

*Computer Electronics
shown with 1 inch
and 2 inch Turbine
Housings which are
sold separately.*



5252 East 36th Street North
Wichita, KS USA 67220-3205
TEL: 316-686-7361
FAX: 316-686-6746

GREAT PLAINS INDUSTRIES, INC.

"A Great Plains Ventures Subsidiary"

www.gpi.net

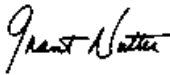
1-888-996-3837

To the owner . .

Congratulations on receiving your GPI Industrial Grade Computer Electronics. We are pleased to provide you with a product designed to give you maximum reliability and efficiency.

Our business is the design, manufacture, and marketing of liquid handling, agricultural, and recreational products. We succeed because we provide customers with innovative, reliable, safe, timely, and competitively-priced products. We pride ourselves in conducting our business with integrity and professionalism.

We are proud to provide you with a quality product and the support you need to obtain years of safe, dependable service.



President
Great Plains Industries, Inc.

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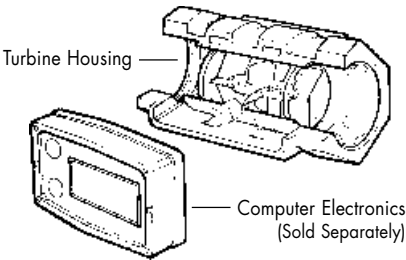
Service 13

WEEE Directive 13

GENERAL INFORMATION

This manual will assist you in operating and maintaining the Computer Electronics of the GPI Industrial Grade Meters. (See Figure 1) Calibration details are given in this manual. Information on turbine housings and accessory modules are contained in other manuals. Please reference those as necessary.

Figure 1



For best results, take the time to fully acquaint yourself with all information about all components of your GPI Electronic Digital Metering System prior to installation and use.

If you need assistance, contact the distributor from whom you purchased your computer.

 This symbol is used throughout the manual to call your attention to safety messages.

Warnings alert you to the potential for personal injury.

Cautions call your attention to practices or procedures which may damage your equipment.

Notes give information that can improve efficiency of operations.

It is your responsibility to make sure that all operators have access to adequate instructions about safe operating and maintenance procedures.

Safety Instructions

For your safety, review the major warnings and cautions below before operating your equipment.

1. This equipment is approved to handle only fluids which are compatible with all wetted materials.

2. When measuring flammable liquids, observe precautions against fire or explosion.
3. When handling hazardous liquids, always follow the liquid manufacturer's safety precautions.
4. When working in hazardous environments, always exercise appropriate safety precautions.
5. For best results, always verify accuracy before use.

Product Description

These computer electronics are designed specifically for use on GPI Industrial Grade Turbine Housings. They are also designed to work with several accessory output modules.

The CMOS, microprocessor-based electronics have extremely low power requirements and data retention capabilities in both RAM and ROM. Information is clearly displayed on a large 6-digit LCD readout with two-point floating decimal for totals from .01 to 999,999. All operations are easily accessed with the two buttons on the front panel.

Liquid flows through the turbine housing causing an internal rotor to spin. As the rotor spins, an electrical signal is generated in the pickup coil. This pulse data is translated from the turbine into calibrated flow units shown on the computer's readout.

Upon receipt, examine your equipment for visible damage. The computer is a precision measuring instrument and should be handled as such. If any items appear damaged or missing, contact your distributor.

Make sure your computer model meets your specific needs. Refer to the Specifications Section to confirm required features. The model number of your computer is displayed on the lower front side of the computer and also underneath a battery.

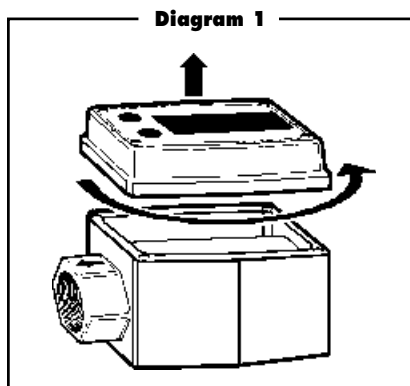
INSTALLATION

If you ordered your computer electronics with a turbine housing, it is installed at the factory.

If you ordered your computer separately from your turbine, simply mount the computer on the turbine with the four screws at the corners of the faceplate. Make sure the O-ring is fully seated before tightening the screws.

If you ordered the computer with turbine and an accessory module, please review and thoroughly understand all installation instructions before proceeding.

All GPI turbines are designed to measure flow in only one direction. The direction is indicated by the arrow cast-molded in the turbine outlet. If the computer display is upside down, remove the four screws, turn the display 180° and reinstall the screws. See Diagram 1.



Avoid electronically “noisy” environments. Install at least 6 inches (15.2cm) away from motors, relays, or transformers.

Our computer electronics are Factory Mutual Approved, C-UL Classified and carry a Class 1, Division 1 Approval for hazardous environments. In addition, GPI meters have NEMA Type 4 enclosures.

To ensure accurate measurement, remove all air from the system before use.

It is strongly recommended that accuracy be verified prior to use. To do this, remove all air from the system, measure an exact known volume into an accurate container, and verify the volume against the readout or recording equipment. If necessary, use a correction factor to figure final volume. For best results, accuracy should be verified periodically as part of a routine maintenance schedule.

OPERATIONS

All operations are reflected in the LCD read-out. The top line identifies the calibration curve. The middle line reflects flow information. The bottom line shows information from the totalizer. Words or “flags” display on the top and bottom line to further identify specific information.

The computer is powered by field replaceable batteries. When the readout becomes dim or faded, the batteries need to be replaced. Reference the Maintenance Section for details.

NOTE: Operations can be practiced prior to installation. To simulate flow conditions, blow gently through the turbine.

Turn On

The meter is on when any display is present. It turns on automatically when liquid flows through the meter. It can be turned on manually by pressing and releasing the DISPLAY button.

Turn Off

Whenever no flow has been sensed for one minute, the unit automatically switches to a power-saving “sleep” mode with a blank display. The unit will automatically “wake up” the moment any flow is sensed and will remain awake as long as fluid is flowing. Totals are never lost during sleep periods.

Batch and Cumulative Totals

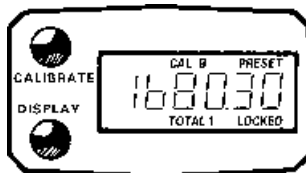
Total flags are displayed on the bottom line. The Cumulative Total (labeled TOTAL 1 LOCKED) is the total of all fluid measured since the meter’s power was connected. (At your first use, the Cumulative Total may not read zero because of calibration at the factory.) The Batch Total (labeled TOTAL 2) indicates flow during a single use.

Clearing a Totalizer

The Batch totalizer register (TOTAL 2) may be independently cleared to 0.00 at any time. To clear a batch totalizer, with the desired totalizer displayed, press and hold the DISPLAY button. At about three seconds, the displayed total will be cleared to “0.00.” You can do this even while fluid is flowing, in which case counting will resume after you release the DISPLAY button.

The Cumulative totalizer register is labeled as TOTAL 1 LOCKED indicating that it cannot be manually zeroed (See Figure 2). The Cumulative totalizer can be cleared only when the batteries are removed or go dead or when the Cumulative Total reaches the maximum value of 999,999.

Figure 2



Changing Display Registers

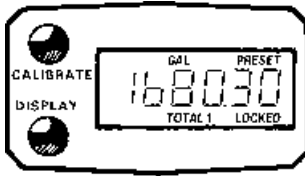
To change to another totalizer register or to FLOWRATE mode during normal operation, watch the bottom line display flags while you briefly press and release the DISPLAY button. When you press and release the display buttons, the mode will advance as follows: TOTAL 1 LOCKED (Cumulative Total), TOTAL 2 (Batch Total), FLOWRATE, TOTAL 1 LOCKED (etc.). You can change registers at any time, even during flow. Non-visible totalizer registers will continue to accumulate.

NOTE: Generally, display registers change when the buttons are released.

Factory and Field Calibration Curves

GPI “09” series flow computers have enhanced calibration features. All calibration information is visible to the user as words in the upper part of the display, above the numeric digits.

All units will be configured with a “factory” calibration curve, for which units of gallons or litres may be selected by the user (“GAL” or “LTR” will be visible). This curve is NOT user adjustable: the word “PRESET” is displayed to show this. (See Figure 3) The factory calibration is stored permanently in the computer’s memory.

Figure 3

The “field” calibration curve(s) may be set by the user, and can be changed or modified at any time using the calibration procedure described below in the CALIBRATION section. Totals or flowrate derived from the field calibration are visible when the field calibration setting is selected (“CAL B” or “CAL C” will be visible).

Selecting a Different Calibration Setting

You can switch between GAL and LTR modes at will without “corrupting” totalizer contents. For example, the computer can totalize 10.00 gallons. If the user switches to LTR mode, the display will immediately change to “37.85” (the same amount in units of litres). GAL / LTR switching also works in FLOWRATE mode.

To select a different calibration setting, first press and hold the CALIBRATE button. Continue to hold it while also briefly pressing and releasing the DISPLAY button (you may then also release the CALIBRATE button). The flag indicators in the upper area of the display will change to show the newly selected calibration setting. Calibration settings change in this order: GAL, LTR, CAL B, CAL C, GAL (etc.). While fluid is flowing only the GAL and LTR selections may be made, however, when NO fluid flow is occurring, any setting may be selected.

Flowrate Mode

The Rate of Flow feature is accessed by briefly pressing and releasing the DISPLAY button as described above. When this feature is activated, the word “FLOWRATE” displays to the left on the bottom line (See Figure 4) and the numbers in the middle of the display reflect the rate of flow (instead of total). Units are set to update the display

every five seconds, so the first reading after flow starts or changes and the last reading after flow stops or changes will not be correct. This is normal.

Figure 4

Propeller

A small propeller displays to indicate liquid is flowing through the meter.

CALIBRATION

Factory Calibration settings are programmed into each flowmeter during production, and are correct for light fluids such as water, gasoline, or diesel fuel. Factory Calibration is completed with either stoddard test solvent (on 1" and smaller flowmeters) or water (on 1-1/2" and larger flowmeters) at 70°F (21°C). Readings using the standard factory calibration curves may not be accurate in some situations – for example, if the unit measures a “heavy” fluid such as motor oil, especially under extreme temperature conditions.

For improved accuracy under such conditions, the GPI flow computer allows for “field” calibration, that is, user entry of custom calibration parameters. A “single point” calibration may yield acceptable accuracy with light liquids, however, heavy liquids may require five or more calibration points to achieve a high level of accuracy. Up to 15 custom calibration points can be entered.

NOTE: A Field Calibration below the minimum flowrate can adversely effect accuracy.

The use of a uniformly dependable, accurate calibration container is highly recommended for the most accurate results. Due to high flowrate, it is strongly recommended that

Field Calibration of 1-1/2" and 2" meters be completed with a combination of volume and weight using fine resolution scales.

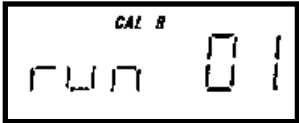
For the most accurate results, dispense at a flowrate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow – these actions will result in less accurate calibrations.

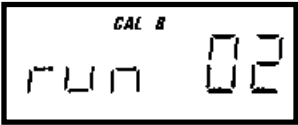
Make sure you meet the meter’s minimum flowrate requirements.

- 1/2 inch meters - 1 GPM (3.8 LPM)
- 3/4 inch meters - 2 GPM (7.5 LPM)
- 1 inch meters - 5 GPM (18.8 LPM)
- 1-1/2 inch meters - 10 GPM (37.5 LPM)
- 2 inch meters - 20 GPM (75 LPM)

For best results, the meter should be installed and purged of air prior to Field Calibration.

Dispense-Display Field Calibration Procedures

Your Actions	Notes
1. Hold down CALIBRATE while pressing and releasing DISPLAY until the Field Calibration curve appears (“CAL B” or “CAL C” message will be displayed). Release both buttons. 	Remember that Field Calibration curves are not preset.
2. To calibrate, press and hold the CALIBRATE button. While continuing to hold CALIBRATE, also press and hold the DISPLAY button. Hold both buttons for about 3 seconds until you see a blinking “dd-CAL” message. Once the “dd-CAL” message appears, release both buttons. You are now in field calibration mode. 	This step puts the unit in dispense-display field calibration mode (“dd-CAL”).
3. Once the buttons have been released from Step 2, the display will show the blinking message “run 01.” 	The computer is waiting for you to make a decision to either exit from field calibration mode or to begin a dispense run. If you want to exit the calibration now, go to Step 11.
4. If you want to continue with the calibration, but have not dispensed any fluid yet, make your final preparations to your pumping system, but don’t start pumping yet.	

Your Actions	Notes
5. Start your pumping system so that fluid flows through the meter. The display will stop blinking and show the “run 01” message. Dispense into a container that allows you to judge the amount of fluid pumped. When you have pumped the desired amount (for example, 10 gallons), stop the fluid flow quickly.	When the computer displays a non-blinking “run 01” message, it is sensing fluid flow. For the most accurate results, dispense at a flow rate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow - these actions will result in less accurate calibrations.
6. Once the flow has stopped, briefly press and release both buttons. At this point the computer display will change to “0000.00” with the left-hand digit blinking. 	When the display shows “0000.00” the computer has stopped “watching” for fluid flow and is now waiting for you to enter some numbers.
7. Enter the volume (amount) of fluid that you dispensed (for example, if your 10-gallon container is full, enter “10.00” for gallons or “37.5” for litres). To enter numbers use the CALIBRATE button to change the value of the digit that is blinking and use the DISPLAY button to shift the “blink” to the next digit. 	
8. Once the correct number has been entered, briefly press and release both buttons. The display will now change to a blinking “run 02” message. 	You have installed the new cal-curve point. You are ready to end calibration (Step 10) or enter another new calibration point (Step 9).
9. To enter another calibration point, go back and repeat Steps 3 through 8.	It is possible to set up to 15 cal-curve points, and the “run ##” message will increment each time you repeat the calibration process (run 01, run 02, run 03, etc., up to run 15).

Dispense-Display Field Calibration Procedures - cont'd.

Your Actions	Notes
10. To end calibration, press and hold both buttons for about 3 seconds until you see the "CAL End" message. 	After you release the buttons, the computer will resume normal operations with the new cal point(s) active.
11. If you HAVE NOT dispensed any fluid, you can exit calibration without changing the cal curve. If the message "run 01" is showing and you have not dispensed any fluid, hold both buttons for about 3 seconds until you see a "CAL End" message. 	After you release the buttons, the computer will resume normal operation and the old curve (if you have entered one in the past) is still intact.

USER CONFIGURATION

The new "09" series GPI flow computer has been programmed with many new features, most of which can be enabled by the end user by way of a configuration process. By disabling "unnecessary" features, day-to-day flowmeter operation can be greatly simplified, making the unit easier to use. There are several features that GPI disables by default when shipping standard meters. (For example, K-Factor Entry Field Calibration, described below.) For more advanced users, it may be desirable to enable ALL possible features. User configurable features include:

- Totalizers/Modes Enabled (Cumulative Total, Batch 1 Total, Batch 2 Total, Flowrate Mode)
- Flowrate Update Intervals (1, 2, 5, 10 seconds; 1, 2, 10 minutes; 1 hour.)
- Flowrate Timebase (Units per Minute, Hour, or Day)

- Factory Calibration Curve Units Enabled (Gallons, Imperial Gallons or Litres)
- Field Calibration Curve B and/or C Enabled
- Dispense/Display or K-Factor Entry Calibration
- Maximum Resolution for Field Calibration (0, 1 or 2 Decimals)

Changing Configuration Settings

Access to the configuration process is restricted for security until a "password" is entered. Contact your distributor or GPI to get the password and instructions to unlock and reset configuration settings. This information is also available on the GPI website. Configurations are entered and stored as six-digit "codes" where each digit represents a setting for one of the configuration options. New configuration settings are stored in the

computer's long-term memory and will not be lost either in OFF mode or during battery change.

K-Factor Entry Field Calibration

Presently all GPI computers are programmed with two different field calibration methods, only one of which is active, the “dispense-display” calibration procedure described above. It is possible to activate “K-Factor entry” field calibration by changing configuration settings. Contact your distributor or GPI to get the correct password, configuration code, and instructions for this calibration method. This information is also available on the GPI website. K-Factor Entry Calibration is similar to the dispense-display calibration procedure described above, and allows up to 15 calibration points to be entered using meter K-Factor inputs.

MAINTENANCE

The computer electronics are powered by lithium batteries which provide at least 9,000 hours (1 year). Under most conditions, the batteries need to be replaced about once a year. Removing the batteries before storing the meter will extend battery life. If the meter's readout should become dim or blank, the batteries should be replaced. Replacement batteries can be ordered from your distributor or the factory. See details in the Parts Section.

When batteries are disconnected or fail, the Batch and Cumulative Totals return to zero. Factory and Field Calibration Curves are retained in the meter's computer when power is lost.

It is strongly recommended that battery check and terminal cleaning be a part of a routine maintenance schedule. Battery terminals should be cleaned annually. Batteries can be replaced without removing the meter from the piping system.

Replace Batteries

1. Remove the corner screws from the meter face and lift the computer electronics from the turbine.
2. Remove the batteries.
3. Check the battery terminals and remove any corrosion.
4. Install the new batteries and make sure the positive posts are positioned correctly. When the batteries are installed correctly, the computer powers on automatically and the readout displays information.
5. Make sure the O-ring is fully seated before placing the computer electronics on the turbine. Tighten the four screws.
6. Do not clean exterior of computer assembly with Isopropyl Alcohol.

TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
Meter is not accurate	1. Field Calibration not performed properly	Field calibrate again or select Factory Calibration.
	2. Factory Calibration not suitable for liquid being measured	Perform a Field Calibration according to Calibration Section.
	3. Meter operated below minimum flowrate	Increase flowrate.
	4. Meter partially clogged with dried liquid	Remove meter. Clean carefully. Make sure rotor spins freely.
	5. Turbine bearings partially clogged with dried liquid	Remove meter. Clean carefully. Make sure rotor spins freely.
	6. Sealant material wrapped around rotor	Remove meter. Make sure rotor spins freely.
	7. Installed too close to fittings	Install correctly.
	8. Installed too close to motors or electrically “noisy” environment	Install correctly.
Readout faded or blank	1. Batteries weak, dead, or not connected	Remove computer, check and replace batteries if necessary.
	2. Computer defective	Contact the factory.
Normal flowrate but meter does not count (Meter comes on when DISPLAY button pushed)	1. Field Calibration not performed correctly	Field Calibrate again or select Factory Calibration.
	2. Rotor stuck or damaged	Remove meter. Make sure rotor spins freely.
	3. Sealant material wrapped around rotor	Remove meter. Make sure rotor spins freely.
	4. Computer defective	Contact the factory.
Reduced flowrate and meter does not count (Meter comes on when DISPLAY button pushed)	1. Meter clogged with dried liquids	Remove meter. Clean carefully. Make sure rotor spins freely.
	2. Below minimum flowrate	Increase flow.

Symptom	Probable Cause	Corrective Action
Cannot get meter into field calibration	1. Factory Calibration (PRESET) curve active	Hold down CALIBRATE and push and release DISPLAY until PRESET flag goes off. Proceed with calibration according to the Calibration Section.
	2. Computer circuit board defective	Replace computer. Contact the factory.
	3. Button defective	Replace computer. Contact the factory.

SPECIFICATIONS

Standard Features Include:

- 2 Totalizing Registers
- 1 Factory Calibration Curve
- 2 Field Calibration Curves
- Rate of Flow Feature
- Flowrate Time Base in Minutes

Input Pulse Rate:

Minimum Pulse In: DC
 Minimum Coil Input: 10 Hz
 Maximum Raw: 1,000 Hz

K-Factor:

Minimum: .01 pulses/unit
 Maximum: > 999,999 pulses/unit

Field Calibration:

Minimum Time: 10 seconds

Readout Totals:

Minimum Display: 0.01
 Maximum Display: 999,999

Temperatures:

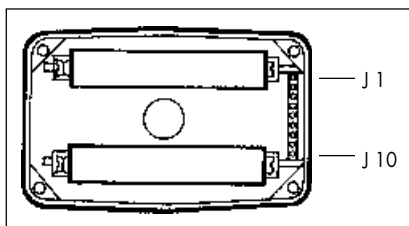
Operational: +14° to +140°F
 (-10° to +60°C)
 Storage: -40° to +158°F
 (-40° to +70°C)

If wider operating temperature ranges are desired, reference information on GPI Remote Kits.

Power:

Internal Power Supply: 2 Lithium Batteries at 3 volts each
 Minimum Battery Life: 9,000 hours of use (1 year)
 Optional External Power Module: 7-30 VDC

Computer Electronics Terminal Connections



J-1 Reset

Programming interfaces. Not accessible to user.

J-2 Pulse Signal Output

This supplies a high-level amplified open collector signal. Output will withstand a maximum open-circuit voltage of 60 volts DC and a maximum closed-circuit of 100 mA.

J-4 Pulse Signal Input

Requires a sine or square wave with open-circuit voltage of 3-30 volts P-P, a maximum rise/fall rate of 0.01 V/ μ second and a maximum frequency of 750 Hz.

J-5 Power Input

When used with Ground (J1-6), this has reverse polarity protection, but no on-board voltage regulation. Supplied voltage may be 5 volts to 10 volts DC.

J-6 Ground

J-7, 8, 9, 10 Programming interfaces. Not accessible to user.

NOTE: Safety approvals are void if any external connections are made to computer electronics.

PARTS

The factory, when provided with model number and serial number, can replace your entire Computer Electronics Assembly.

Order replacement kits, parts, and accessories with the part numbers given here.

Part No.	Description
113520-1	Battery Replacement Kit
901002-52	O-Ring
116000-1	Large (5 gal.) Calibration Container

SERVICE

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, call the GPI Customer Service Department in Wichita, Kansas, during normal business hours.

1-888-996-3837

To obtain prompt, efficient service, always be prepared with the following information:

1. The model number of your computer electronics.
2. The serial number or manufacturing date code of your computer electronics.
3. Specific information about part numbers and descriptions.

For warranty work always be prepared with your original sales slip or other evidence of purchase date.

Returning Parts

Please contact the factory before returning any parts. It may be possible to diagnose the trouble and identify needed parts in a telephone call. GPI can also inform you of any special handling requirements you will need to follow covering the transportation and handling of equipment which has been used to transfer hazardous or flammable liquids.

CAUTION: Do not return computer electronics or meters without specific authority from the GPI Customer Service Department. Due to strict regulations governing transportation, handling, and disposal of hazardous or flammable liquids, GPI will not accept computer electronics or meters for rework unless they are completely free of liquid residue.

CAUTION: Meters not flushed before shipment can be refused and returned to the sender.

WEEE DIRECTIVE



The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) was approved by the European Parliament and the Council of the European Union in 2003. This symbol indicates that this product contains electrical and electronic equipment that may include batteries, printed circuit boards, liquid crystal displays or other components that may be subject to local disposal regulations at your location. Please understand those regulations and dispose of this product in a responsible manner.

**Copy the information located on the Turbine housing.
This information will be required by Customer Service.**

Model No: _____

Serial No: _____

MFD: _____

Distributor Name: _____

Distributor Phone Number: _____

Declaration of Conformity

Manufacturer's Name: Great Plains Industries, Inc.
Manufacturer's Address: 5252 East 36th Street North
Wichita, KS USA 67220-3205

Declares, that the product:

Product Name: Electronic Digital Meter
Model Numbers: 03*****
A1*****
A2*****
G2*****

*Model numbers include all combinations
of an alpha-numeric series as illustrated above.*

Conform to the following Standards:

EMC: EN 50081-1 (Reference EN 55022)
EN 50082-1

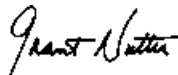
Energy - Limited Apparatus: EN 50021
I.P. Code: BS EN 60529

Supplementary Information:

"The products comply with the requirements of the EMC
Directive 89/336/EEC and the ATEX Directive 94/9/EC
(ANNEX VIII)."

I, the undersigned, hereby declare that the equipment specified above
conforms to the above Directive(s) and Standard(s).

Signature:



Full Name:

Mr. Grant Nutter

Position:

President

Great Plains Industries, Inc.

Place:

Wichita, KS USA

May 2003

Limited Warranty Policy

Great Plains Industries, Inc. 5252 E. 36th Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 1 year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. The warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of manufacture or on the date of purchase with an original sales receipt. This warranty shall not apply if:

- A. the product has been altered or modified outside the warrantor's duly appointed representative;
- B. the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, contact the GPI Customer Service Department at 316-686-7361 or 888-996-3837. Or by mail at:

Great Plains Industries, Inc.
5252 E. 36th St. North
Wichita, KS, USA 67220-3205

The company shall, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC., EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

Note: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT – Part 702 (governs the resale availability of the warranty terms).



Factory Mutual Approved
Intrinsically Safe for Class I, II, III, Division 1, All Groups.



NEMA
4



5252 East 36th Street North
Wichita, KS USA 67220-3205
TEL: 316-686-7361
FAX: 316-686-6746

GREAT PLAINS INDUSTRIES, INC.

"A Great Plains Ventures Subsidiary"

www.gpi.net

1-888-996-3837

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APPENDIX X
PROJECT PHOTOGRAPHIC LOG



Looking west at installation of subgrade



Looking east at installation of subgrade



Looking west at installation of compacted clay liner system



Construction of north overbuild berm



Construction of leachate collection trench



Excavation of leachate collection sump



Looking west at completed compacted clay liner system



Looking north at installation of 60-mil HDPE geomembrane liner



Continued installation of 60-mil HDPE geomembrane liner



Completing tie-in to existing Cell 1 liner system



Installation of geosynthetic clay liner and double geomembrane liner in leachate sump



Deployment of 8 ounce double sided geocomposite drainage layer



Completing installation of 8 ounce double sided geocomposite drainage layer



Looking west at installed leachate collection trench



Looking west at installation of 18-inch thick sand protective cover layer